SAFETY ENGINEERING

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Next, 50th Anniversary Year

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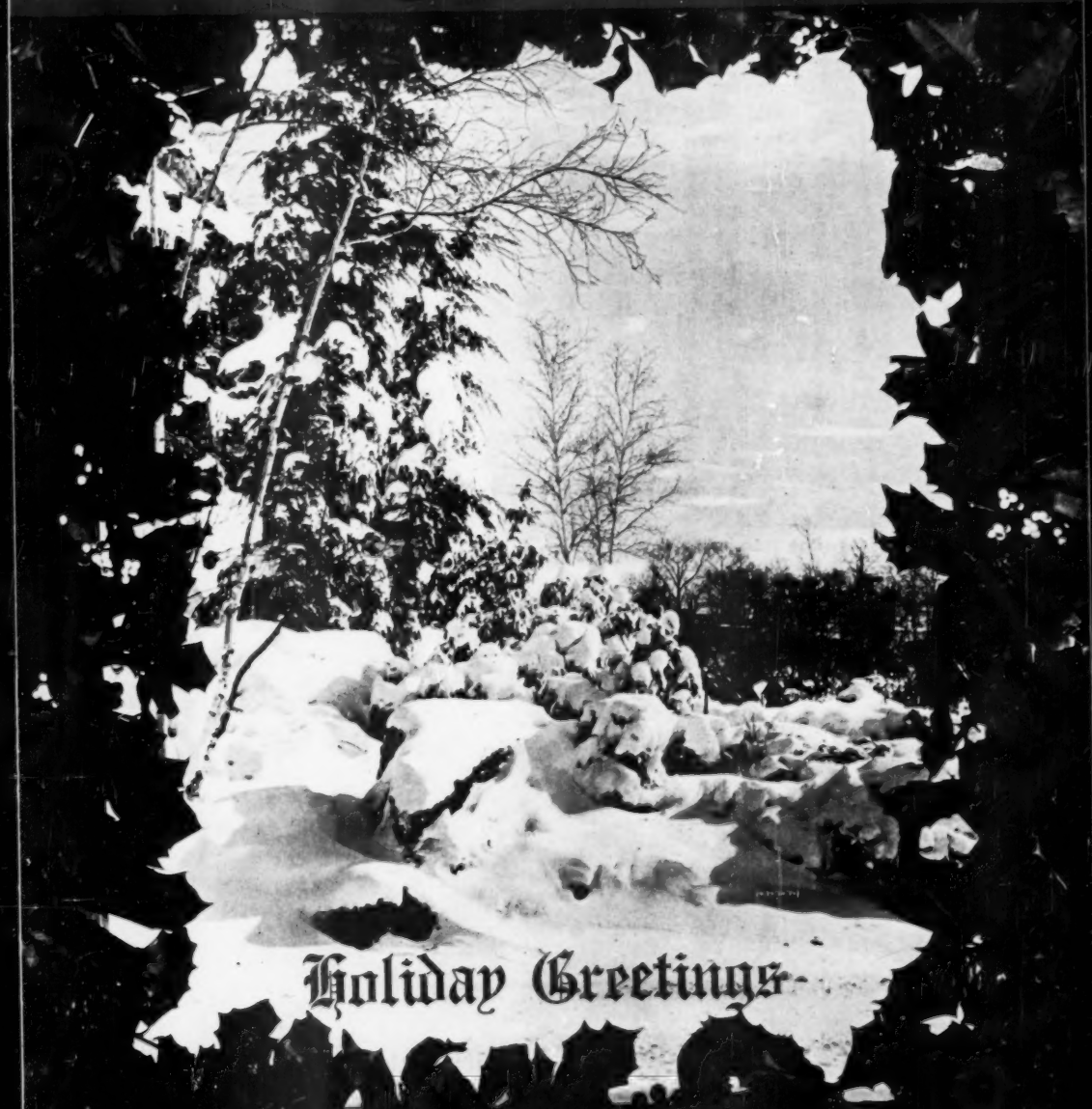
AMERICA'S PIONEER SAFETY MAGAZINE



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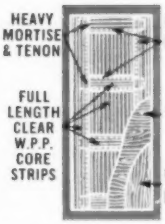

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Holiday Greetings

It's Safe to Say

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★ SQUEEZE-PENNY ECONOMY

TO COPE with a national problem affecting all our citizens, public opinion properly aroused, usually is followed by action for the common good. The crusade to prevent accidents and their incalculable financial losses is no exception to this axiom.

Recognizing that there is no better method of stimulating public support of any accident prevention campaign than through the medium of the press, Hon. Maurice J. Tobin, U. S. Secretary of Labor announces the first issue of a Safety News Letter, published by the Presidents' Conference on Industrial Safety, Bureau of Labor Standards, U. S. Department of Labor.

In the first issue of the News Letter, Secretary Tobin emphasizes the nationwide program to lower the accidental fatality and injury rate and calls upon residents in every part of the country to join together to reduce the appalling loss in life and permanent disabling injury caused by industrial accidents. The Secretary rightly states that this task is a public responsibility of the highest order worthy of the utmost cooperative effort.

Good news comes from the Labor Department as a result of the Federal Government's participation in the campaign for industrial safety. According to preliminary estimates of work injuries in manufacturing industries for the first six months of this year, an 18 percent reduction is indicated compared with the same period of 1948. This should be cause for rejoicing in many families throughout the land. If the present favorable trend continues for the full twelve months of the year, 1949 may well show one of the best safety records in a decade and at a time when employment is maintained on a high level.

To those of us intimately concerned with the advance of the safety movement, it is indeed heartening to note that the Labor Department's Bureau of Labor Standards is taking a practical approach to solving the problems of preventable death and injury. Through the Safety Standards Division, services are rendered to state agencies administering labor laws and safety technicians are cooperating with the states in planning specialized safety programs for use in high-hazard industries.

Unfortunately, however, too many of us are prone to focus our sights entirely on those so-called high-hazard operations and overlook the smaller, "safe" plants that can be the chief offenders in shattering good safety records. The allegedly dangerous industries are quick to investigate the possibility of an accident *before* it happens and surround the personnel with the best in brains and equipment to forestall disaster. On the other hand, an analysis of individual accidents will show that indifference to accident prevention is rampant on the low-hazard jobs.

This brings to the fore the danger of an economy wave which has its beginnings in those operations affecting safety to life and property. In the dark days of the early thirties, it was quite commonplace to note that the first move in the direction of retrenchment began in the safety department. Management soon found that it paid dearly for this short-sighted policy and, in succeeding years, we took pride in the knowledge that a more enlightened line of reasoning came into being.

Even very recent history has an unfortunate way of repeating. Now once again we learn that safety directors, inspectors and even industrial nurses are viewed with jaundiced eye by the Squeeze-Penny fraternity who apparently have no knowledge of the pound-foolish truism, devalued though that pound may be. Let a strike loom up on the horizon or a few cancellations come in and they begin by stopping all purchases of safety devices and services and the safety director must shudder in his boots for fear he will get the well-known ax. This brand of "economy" is perilously near to criminal negligence and can do more to break down morale and wreck the labor-relationship than a blast from an arrogant labor leader. Is it any wonder that those plants have a disproportionate number of accidents? Very little actual economy will result if it is attempted at the expense of the safety campaign.

It is gratifying to see the participation of our national government in the cause of industrial safety and our Federal Labor Department deserves the thanks of all industry itself but despite the now-fashionable trend of thinking, we cannot expect any government, no matter how paternalistic, to carry the ball alone. H.A.

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EST. 1901

VOL. 98, NO. 6 BEST'S 50TH ANNIVERSARY YEAR
DECEMBER 1949

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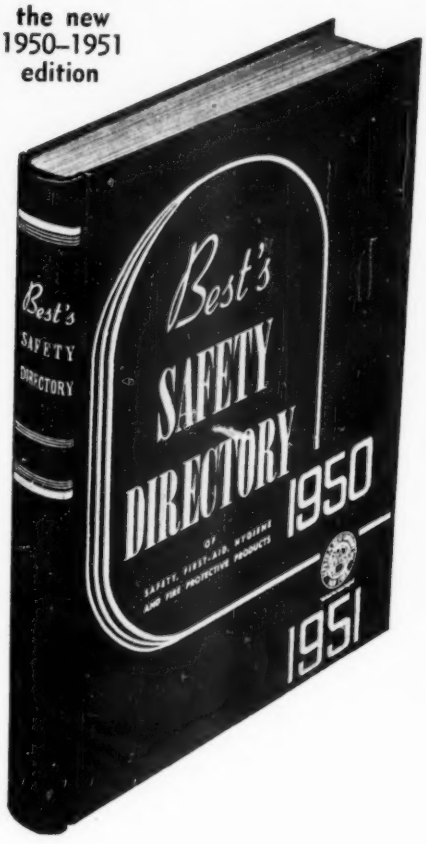

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SAFETY ENGINEERING
VOL. 98, NO. 6 • DECEMBER, 1949

MAKE SAFETY MEETINGS COUNT

Are your safety meetings effective? Do they produce lasting results? If there is room for improvement, take note of these suggestions for making them more worthwhile.

By LINCOLN H. LIPPINCOTT,
Manager, New Haven Safety Council, New Haven, Conn.

IN THE article "Are Safety Meetings Worthwhile?" from the November issue of *Safety Engineering*, it was concluded: "A safety meeting is a tool to do a specific job. In using it, there are other tools whose correct use influences the result obtained. These tools are place, time, subject, group, subject development, preparation and follow-up."

Production-minded men will grasp immediately that successful accident prevention through meetings is dependent upon the use of the right tools. The wrong tool or incorrect use may produce waste and set up definite obstacles to safe operation.

Profits in business do not come from assumptions, but from definitely knowing costs.

Place

Place is a basic tool. No matter where a meeting is to be held, there are three minimum requirements:

1. Avoid distractions so that attention may be easy.
2. Make sure that every member of the group can see and hear.
3. Reasonable comfort for those attending.

Meeting these minimum requirements is a definite way for management to emphasize the importance it places upon safety in operation procedure.

Time

Schedule the meeting so that the majority of the group will be in the most receptive mood. Time will vary according to the problem of the individual plant, but its selection should not be without due consideration or merely because of long-established custom. If the time selected interferes with departmental operations, attention will be divided. If it hits a point of high fatigue, maximum understanding and participation will not be forthcoming. Meetings that are too short may imply that *(To page 49)*

HOW TO HANDLE CHEMICALS

By GORDON C. HARROLD, Michigan State Department of Labor & Industry

To prevent fires, explosions, toxic effects and injury in the handling of hazardous chemicals, consideration must be given to thorough knowledge of the chemical, good housekeeping, protective clothing, process control, plant construction, storing procedures, shipping requirements and labelling.

ALL chemicals are hazardous. Someone once said that the least poisonous of all chemicals was water as it took from sixty-five to seventy-five years to kill. The statement serves to point out the fact that any substance under certain conditions is harmful to the human system. For this reason, broad classifications of all substances should be compiled so that each group may be considered on its merits. Do not neglect a substance because it appears to be a less harmful material than others usually dealt with in your daily operation. Conversely, do not overemphasize the hazard of a new substance just because it is new. In technical use as well as safety considerations, a new product ultimately finds a level of usefulness and of safety, commensurate with the facts involved. The tendency to glorify something because it is new is the same mental approach we find used by those responsible for its safe usage. The viewing with alarm of all new substances or compounds is equally unjustified.

That very few safety engineers consider the health and fire hazards is intrinsically no fault of the individual but of a system which has set up artificial dividing lines about where a given agency shall operate. It is true that at one time these restrictions were set up because the established agencies had not the training or foresight to fully encompass the problems presented. However, it is equally true that industrial hygiene personnel on the average is poorly prepared to do anything about the physical or mechanical hazards of chemicals and even less prepared to do a job on the explosion or fire potentialities of hazardous chemicals.

It is not impossible for individuals specializing in any one of the fields mentioned to become proficient in all fields over a period of time. This is particularly true if the medical aspects of industrial health are completely relegated to the industrial physician. The preventive aspects of safety and industrial hygiene properly performed are largely an engineering function and when really well done, they leave little for the medical part of Industrial Safety and Health. In fact, that many aspects of the problem have become a part of medical programs is due in part to the fact that the job has been done in its entirety in a highly satisfactory manner by the existing agencies.

FEATURE

This is the first of three feature articles concerned with the Safe Handling of Chemicals. The next two articles of the series will be published in the January and February, 1950 issues of SAFETY ENGINEERING.

Know the Chemical

The safe use and handling of chemicals should be the same in their use, as in their manufacture. More trouble is experienced in the use of small quantities than in the manufacture of bulk quantities because equal precautions are not observed. The use of relatively small amounts leads to the belief that no hazards exist or that such hazards as are known will not be effective under the circumstances.

The first requisite in the handling of any chemical should be the ascertaining of all available information about the chemical. This information can usually be obtained from the supplier. Supplementing this source are the various trade associations such as the Manufacturers' Chemical Association, Plastic Mfg. Association, Paint & Varnish Association, etc. The various governmental agencies, national, state and local, also have some information. Health and Safety hazards are sometimes known to the Bureau of Mines, the Public Health services or the Departments of Labor. Non-governmental agencies

SAFELY

Detroit, Michigan

such as the National Safety Council, Industrial Hygiene Foundation or private consultants usually have pertinent information as to the qualities of the material under consideration.

The Need for Good Housekeeping

After ascertaining the above information, the most important control measure is good housekeeping and all that is implied by that term. First, the amounts of dangerous material held in a given building or area must be held to a minimum. Materials giving off dangerous vapors should be kept in properly closed containers. Spilled materials should be cleaned up immediately and this applies to toxic or explosive dust on walls or machines as well as to liquids.

Floors and working surfaces should be smooth, impervious, and capable of being easily cleaned. Of course, no accumulation of cleaning materials should be tolerated because of the danger of spontaneous combustion or misuse for other than intended purposes.

Precautions should be taken to prevent the mixing of effluents which may cause the evolution of poisonous gas. Where possible, drains and sewers should be permanently draughted by connecting to a chimney stack.

Respiratory Protection

Breathing apparatus and respirators should be provided when safety cannot be assured in other ways, or in cases of emergency, such as the escape of gas, or the rescue of a comrade. The workers should be thoroughly instructed as to the dangerous properties of the materials they have to handle, and of any gases, vapors, fumes or dust that may be involved and as to the measures to prevent cases of poisoning. Special attention should be given to the possible effect of long exposure to low concentrations that cause no immediate harm or discomfort. They should also receive instruction regarding the rendering of first aid in cases of gassing.

In enclosed spaces or vessels including tank cars, a continuous supply of fresh air should be provided for the man engaged in the work, and a suitable inspection of the premises for the operation be made prior to doing any work. A life belt shall be attached to the man in the tank in such a manner that he may be brought out head first by the person having possession of the free end of the rope outside of the tank.

The workers should be properly trained and given a periodic refresher course in the use of breathing apparatus and respirators, and should be made to realize that the use of such equipment is a common-sense precaution for their own safety, and not an admission of weakness.

Respirators should be kept properly labeled, in clean, dry, dark cabinets, and if there is a risk of being affected by fumes, they may be protected by paraffined paper bags. They should be dried and cleaned after use, and periodically disinfected.

Special clothing must be washed, cleansed or renewed periodically under arrangements made by the employer. It must, under no circumstances, be taken home by the worker. Care should be taken to prevent the dissemination in the workroom of dangerous material that may have collected on the special clothing.

No food should be stored or kept on or near the *(Continued page 45)*

SAFE LIGHTING WITH

Why are explosion-proof electrical fittings necessary?
How to determine the need for explosion-proof fittings.
What do these fittings do to prevent explosions?

WITH each succeeding year the need for safer electrical installations in the hazardous industries becomes more pronounced. Despite the warnings repeatedly voiced by building contractors and the manufacturers of electrical equipment, the list of disastrous fires and explosions caused by unsuitable wiring in hazardous locations continues to mount.

Electrical fittings considered safe for ordinary application are obviously unfit for installations in locations where flammable gases, vapors, dusts and other easily ignitable flammable material are present. Sparks and electric arcs originating in such fittings are known to have been the igniting medium in innumerable costly fires and explosions.

With the rapid advance of industrial science, more and more industrial hazards present themselves and must be reckoned with. New materials and methods have been found for the application of finishes to automobiles, furniture and other manufactured articles. Unfortunately, many of these finishing practices introduce severe fire hazards. Gasoline and other petroleum products of a highly flammable nature are finding ever-growing use in industry and commerce. Pyroxylin and compounds of which it is a part have come to be used for many purposes. Almost daily the chemical industry discovers new secrets of producing substitutes for natural commodities by synthetic means, often entailing the use of hazardous materials and processes. Industries producing flammable dusts are becoming more numerous and broader in extent.

Before prescribing the proper fittings to be used in any given hazardous location, it is first necessary to determine the exact nature of the flammable materials which are present. For instance, a fitting which is by test found to be safe for installation in an atmosphere of combustible dust may well be unsafe for operation in an atmosphere containing flammable vapors or gases.

Types of Hazardous Materials

The field of commerce and manufacture reveals that the various forms of hazardous matter can be grouped into the following general types:

1. Flammable liquids, which may be divided into these two classes:
   (a) Volatile flammable liquids which give off flammable vapors at ordinary temperatures.
   (b) Relatively non-volatile flammable liquids which give off flammable vapors only at temperatures in excess of those ordinarily reached.
2. Flammable gases, which form flammable or explosive mixtures with air.
3. Highly flammable solids.
4. Highly flammable mixtures which consist of combinations of a material in one of the foregoing classes with a non-hazardous substance as in the case of rubber cement, or combination of two or more materials of the same or separate foregoing classes as in the case of certain lacquers.
5. Combustible dusts which may be either carbonaceous or metallic in nature, either in themselves easily ignitable or capable of forming explosive mixtures with air.
6. Easily ignitable combustible lints, fibers or "flyings."
7. Combustible light material such as wood shavings and paper cuttings.

According to the National Electrical Code, the locations for these various types of hazardous materials are grouped and defined in the following manner:

Class I locations are those in which flammable volatile liquids, highly flammable gases, mixtures or other highly flammable substances are manufactured, used, handled or stored in other than their original containers.

Class II locations are those in which (1) combustible dust is thrown or is likely to be thrown into suspension in the air in sufficient quantities to produce explosive mixtures, or (2) those where it is impracticable to prevent such combustible dust from collecting in such quantities on or in motors, lamps or other electrical devices that are likely to become overheated because normal radiation is prevented.

Class III locations are those in which ignitable fibers or materials

EXPLOSION-PROOF FITTINGS

producing combustible "flyings" are handled, manufactured or used, and which are hazardous through the collecting of such fibers or "flyings" on arcing contacts, resistors, lamps or similar apparatus or being ignited by them.

Class IV locations are those in which easily ignitable combustible fibers are stored and handled (except in rooms where in process of manufacture) and which are hazardous through such fibers being ignited by arcing contacts, resistors, lamps or similar apparatus.

The materials involved in Classes III and IV are very similar in nature, but it will be noted that Class IV deals only with the storage of combustible fibers. The rules of this Class apply principally to large combustible fiber warehouses where special conditions prevail.

Hazardous Uses

Closely associated with the hazard of the materials themselves are the processes or methods by which they are used. To illustrate, let us assume a typical case of a varnish or a lacquer in which a highly flammable liquid is used as the vehicle. Such a material, if in closed containers could, under ordinary circumstances, be stored with safety on the shelves of a paint store, but a considerable hazard is introduced when the same material is applied by the spray method to furniture or other manufactured articles should the process be accomplished in the presence of electrical fittings not of the explosion-proof type.

Obviously, it would not be practical to include in this article a complete list of factories or buildings which produce, use or otherwise handle the various hazardous materials we have discussed and to attempt to define the extent of the hazardous areas in each. Suffice it to say that constant vigilance must be maintained in order to properly wire and illuminate the hazardous areas in which these conditions may exist.

Determining the Amount of Hazard

Contractors and engineers should use every opportunity to familiarize themselves with the more important details of the hazardous industries they encounter. Such a study may include:

1. A thorough study of the processes involved including an investigation of the liquids, gases or solid substances which are to be used, analyzing these materials from the standpoint of ease of ignition, volatility, explosiveness and general hazard rating.

2. A careful study of the machines or devices which are to be used. This is to determine whether or not the hazardous material will be confined within tanks, drums, or piping, or whether or not there will be a possibility of leakage into the open room either during normal operations or through accidents.

3. An inspection of the layout of buildings either from building plans or by actual visual inspection. This is to determine whether one small section of the plant should be thrown into the hazardous classification or whether or not the hazardous conditions extend to all parts.

4. Consulting and cooperating with other inspection authorities, particularly Underwriters' special hazards inspectors who are familiar with conditions in establishments of a nature similar to those under consideration.

5. Frequent reinspections of plants involving hazardous processes or conditions to determine what conditions prevail during actual operation.

6. A study of statistics and reports on fires and accidents suffered in properties where hazardous processes are involved.

Once in possession of the knowledge to be derived from such a study as the foregoing it is relatively simple for any recognized manufacturer of explosion-proof fittings to supply the electrical wiring equipment necessary to render a given installation completely safe and sound.

Ventilation

Matters such as ventilation, confinement of hazardous materials, fire cut-offs may have important

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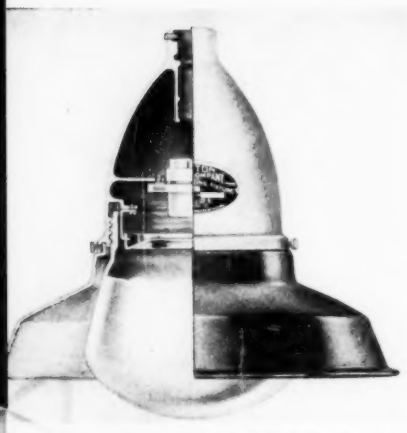
FEATURE

This is the second of a consecutive series of three major articles dealing with Electrical Equipment. The next feature of the series will appear in the January 1950 issue of SAFETY ENGINEERING.



A vapor-tight and dust-tight lighting fixture designed to prevent the accumulation of dust on its surfaces, a major cause of dust explosions.

bearings on classification and the extent of the hazardous area.

Theoretically it is possible to provide ventilating systems which would reduce the amount of flammable gas, vapor or dust in a room or building to the point where the resulting mixture would be below the lower explosive limit. However, under practical conditions it would be unwise to place complete confidence in any ventilating system whether artificial or natural, for weather conditions, direction and velocity of wind, possibility of the failure of ventilating systems and other factors may result in effects favorable to an explosion. In practically all instances, therefore, one is forced to disregard the presence of ventilating systems in the selection of safe wiring and lighting equipment for hazardous areas.

In many processes hazardous materials are confined within closed tanks, piping or other enclosures, and in the interest of economy every effort is made to maintain a system free from leaks. Yet in spite of the best maintenance, leaks develop, containers are ruptured or piping bursts, perhaps because of mechanical disturbances, and hazardous gases or vapors are permitted to escape into the surrounding atmosphere. Thus, in most instances, the worst conditions should be assumed in specifying the electrical fittings to be used in order to assure complete safety.

Fire Walls

In the earlier days of American industry it was not uncommon to find all manufacturing processes conducted under one roof with no attempt at segregating especially hazardous processes from the non-hazardous by fire walls. In modern establishments, however, we usually find these hazardous processes conducted in a separate building or in a section of the main building cut off from the remainder by standard fire walls. Such cut-offs should be given due consideration in determining the extent of the hazardous area. To illustrate, let us assume a metal working establishment where the finished articles are painted by a hazardous spray process, which is conducted in a fire resistive addition to the main plant, cut off by a standard fire wall. Here, of course, assuming no other hazardous process in the main building, the hazardous area is represented only by the spray painting department.

Plant Maintenance

The grade of housekeeping maintained, while of small effect from the engineer's standpoint in establishments where flammable vapors or gases may be present, is important where the other types of hazardous materials are concerned. However, the inspector has no assurance that favorable conditions of housekeeping and general care will prevail continuously. Management or personnel changes may cause conditions to decline to such a degree that the most rigid standard of electrical construction would not be sufficient. Faced with such considerations it is safest to disregard to a large degree housekeeping and general care in determining whether or not certain premises should be equipped with explosion-proof electrical fittings.

The responsibility for determining whether or not a specific location is hazardous is usually left to company engineers. However, due to the complexities involved in the proper analysis of flammable gases, vapors and dust it is not always easy to determine the extent of existing hazards. It is for this reason that the leading manufacturers of electrical equipment maintain a staff of engineers to guide buyers in the purchasing of such explosion-proof fittings as is best suited to their particular need.

The wiring of hazardous locations is at least one place where a contractor cannot indulge in material skimping. This is a job that must be first quality throughout, if it is to pass inspection. Only fittings which have undergone exhaustive tests and meet the requirements of the Underwriter Laboratories for use in hazardous locations should be used. They must be made of durable material, provide thorough protection and be so finished as to be totally resistant to atmospheric conditions.

Explosion-Proof Electrical Fittings

Many hazardous industries have long considered it advisable to use explosion-proof fittings, not only as a matter of protecting *(To page 40)*

Explosion-proof and dust-tight handlamp with the extension cord wound on an explosion-proof reel.

One of Britain's crane-drivers ascending a newly designed ladder. Used for mounting to cranes, it is a vast improvement on the old vertical ladders. The new construction makes it almost impossible for the driver to fall. The half-way platform gives the driver a rest during his climb.

PREVENTING ACCIDENTS IN BRITAIN . . . . .

By PHILIP TYNDALE DREW
Former Editor of
"The Factory Manager"
(London)

A CENTURY of legislation covering factory working conditions has resulted in a very high standard of safety in Britain's industry today. This has been achieved as a result of constant and careful research into operating circumstances and the behavior of machinery, as well as the study of the human element in every industry.

While full credit must be given to Britain's Inspector of Factories, it would be unjust not to give credit also to employers themselves who cope practically with the problem of preventing accidents.

In fact, the general rule by which both the Factory Department of Britain's Ministry of Labor and the employer have been guided is to keep a move or two ahead of existing legislation. The safety-laws made, culminating in the 1937 Factories Act, exist to provide authority with adequate powers to deal with the occasional bad employers who appear with every generation. The laws are of searching character, for without them, accident rates through negligence would be much higher than they actually are.

Many of the requirements laid down in the 1937 Factories Act merely incorporate recommendations made in voluntary agreements between the Inspector of Factories and various industries as far back as 1911. The Committee on Accidents in Factories decided then that conferences should be held regularly in these industries to discuss the best means of maintaining safe operating conditions. Obviously, these agreements had no legal value. But for that very reason they had an even greater practical value because efficient employers have made great contributions to the furtherance of safety in industry based on their practical knowledge.

Regulations for Machine Guarding

Owing to the technical complexities of operating conditions in the whole range of industries, *(Page 44)*

FIRE

Fig. 1. Wash tank with fusible-link cover.

Fig. 2. Spring-activated closure on safety can.

Fig. 3. Safety can with automatic spring closure.

By E. A. ANSCHICKS, Safety Director
The Protectoseal Company, Chicago, Illinois

Every factory and shop has the problem of storing and handling liquids that are flammable. These fire-breeding materials can be used safely if suitable containers are provided.

MUCH of the mystery surrounding the safe, economical use of flammables in the average industrial plant has been removed by adopting a few simple common-sense rules governing methods and practices.

Industry has become alerted by daily tragedies reflected in random newspaper headlines—"Flash fire destroys $150,000 plant"—"Exploding gasoline can kills factory worker"—"Blast victim dies"—"Lynn fire starts by explosion"—"Chain blast flames shatter Vernon plant."

How do these fires and explosions start? Some of the common but unsafe and wasteful practices picked up from plant inspection reports just recently are shown below.

These are common, everyday examples that daily open up the risk of disastrous fires, destruction of property, and injury to workmen. Only by eternal vigilance and systematic inspections by qualified engineers can any plant be sure of having taken the necessary precautions from the time that flammables are delivered to the plant until finally consumed.

What Does Burn?

A few well known facts about flammables provide the basis for simple, proven procedures where flammables are stored, handled and used.

For example, flammables generally do not burn but the vapors from the liquid do burn. Often these vapors cannot be seen, yet vapor hazards are present wherever flammable liquids are received, stored, dispensed or used.

Danger from flammable liquids exists when the temperature of the explosive mixture reaches the flash point. These explosive vapor mixtures are not confined around the source of the flammable liquid. Most flammable vapors are heavier than air and may be said to "flow" or "drift" a considerable distance from the point of origin.

The proved procedures for handling flammables, therefore, involve precautions that avoid: creating excessive vapors, open exposure to sources of ignition, spillage, and incorrect confinement or storage that fails to provide adequate pressure and vacuum relief.

Automatic Closing Devices

Flammable liquids should be

How Do Fires and Explosions Start?

Man using open 5-gallon buckets as wash tanks.
Man transporting flammable solvents from source of supply to point of operation in open 5-gallon buckets.
Drums of flammable solvents with no approved bung fitting.
Open pipe lines with no flame arresters.
Open bucket filled with water for oily waste rags.
Makeshift cans in laboratories for storing solvents.
Man pouring solvents from open buckets on roller mills to clean same.
Storage tanks having no protection on rodding hatch.
No protection on vent pipe.
Operator pouring flammables from one container to another using a funnel.

CONTROL FOR FLAMMABLE LIQUIDS

Fig. 4. Supply can's pouring hose prevents spills.

Fig. 5. Plunger can reduces flammable vapors.

Fig. 6. Viscous material can.

stored in or dispensed from safety containers that observe a few common-sense principles of design and construction. Automatic closing devices are required and are generally of two types: (1) fusible link controlled closure, (2) the spring-activated safety closure.

Fusible links melt under specified temperatures to close the container and by cutting off the air supply, extinguish the fire. See Figure 1.

Spring activated closures are engineered to seal so effectively that leakage is prevented even when containers are inverted. See Figure 2. Positive protection must be provided against flashbacks making it necessary to provide flame arresters in every true safety container. For the effective arresting of flashbacks the double-walled concentric cylinder of perforated metal with solid or perforated conical base must be used.

These fundamental principles of protection are incorporated into various types of containers, which for practical purposes may be classified as follows: (1) Safety Can, (2) Supply Can, (3) Production Can, (4) Special Purpose Can, (5) Oily Waste Can. These serve industry as guarantees against hazards of fire and explosion which exist wherever flammables are used.

Safety Can

The safety can is the most common type of container used today. These cans are constructed of heavy gauge sheet terne plate for strength and durability. They have one opening for both filling and pouring. See Figure 3. This opening is equipped with a fire arrester made of double walled perforated metal to protect the contents within the can from igniting during filling or pouring operations. The fill cap is usually of the lever-actuated, spring-loaded type, and is mounted on a ball and socket joint so that it automatically makes a complete and tight closure all around the spout rim. This prevents loss by evaporation and prevents leakage. The principle of the ball and socket cap also provides automatic pressure relief in the event of built-up pressures within the can. These cans are offered in a wide range of sizes from one pint to five gallon capacity. They must also meet the requirements of insurance and fire authorities.

Supply Can

The Supply Can differs slightly from the standard Safety Can. It has separate fill and pour openings. See Figure 4. The fill opening has a self-closing, tight fitting hinged cap to insure against leakage, and also serves as a pressure relief. The pouring spout is equipped with a flexible metal hose, has an easy working valve and vent arrangement whereby the flow of liquid can be positively controlled. Both openings have perforated fire baffles to

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FEATURE

This is the third of four feature articles on Fire Protection. The next article of this consecutive series will appear in the January 1950 issue of SAFETY ENGINEERING.

Fig. 7. Filler can's spout is for small openings

prevent ignition of the contents.

Production Cans

Many production jobs require the use of flammable liquids where parts washing is a factor. A number of cans have been designed to meet the needs of adequate fire protection during washing, sponging, or swabbing operations. The Plunger Can, available in sizes from one pint to two gallons, has a dasher with perforated metal screen attached to a spring mounted plunger set into the center well of the can. See Figure 5. Depressing the dasher pumps a measured quantity of liquid into the dasher cup to moisten a brush, swab, or sponge. When the pressure on the dasher is released, the excess liquid is sucked back into the can reservoir. This unit provides fire protection because it controls the amount of fluid to be used, therefore reduces the amount of vapor around the operation. Should accidental fire occur in this surrounding area, fire baffle prevents contents from igniting. Containers of this type may be procured in sizes and styles to fit individual requirements.

Dip tanks or wash cans are the answer to safe manual washing and cleaning of small parts, sub-assemblies, etc., where the operation requires these parts to be immersed in a fluid. They are available in many sizes depending upon weight, size, and shape of units to be washed. The can or tank consists of an outer shell of heavy gauge metal, and an inner wash or dip basket into which the work is placed and then submerged into the liquid. See Figure 1. When the parts are clean the basket is raised and supported on brackets above the liquid level, to permit the surplus solvent to drain back into the container. These washers are provided with a low melting fuse link assembly which insures automatic closing of the cover in the event of fire.

Special Purpose Cans

Where the dispensing of flammables is required in laboratories, paint departments or special work assignments where accuracy and safety are essential and where the elimination of open bottles and other unsafe containers is mandatory, a can is available to meet these requirements. This Laboratory Can, usually five-gallon size, has a large fill opening at the top furnished with a leak-proof seating cap providing automatic pressure relief, and also has the double walled perforated metal flame arrester. An automatic faucet at the base of the container is also equipped with a flame arrester which serves the dual purpose of a strainer as well. The can may be mounted on a tilt frame.

Where rubber cement or similar viscous materials are dispensed, stored or transported, a container somewhat different in structure from the ordinary safety can is essential. The heavy body of these materials makes it extremely difficult to pour from a standard can. Viscous material cans of five and ten-gallon capacity have unusually large fill openings with spring hinged caps to insure tight seating, as these substances vaporize rapidly. They are furnished with a large, quick-opening, non-dripping gate valve faucet. See Figure 6.

There are also special types of safety containers to fill blow torches, fire pots, gasoline or kerosene appliances, construction flares, or any container having a small fill opening. This can has a long, thin, flexible metal pouring hose that prevents dangerous spilling. See Figure 7. The filler opening is equipped with double-walled perforated metal flame baffle to prevent ignition of the contents. Pouring is facilitated by an easy-action push-button type valve, which is positive and self-closing.

Oily Waste Can

Far too many fires are caused by

(Continued on page 42)

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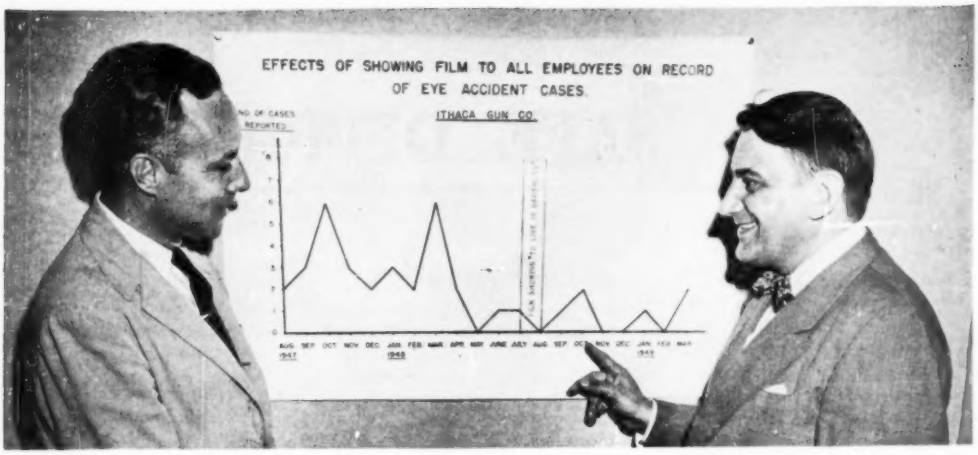

Charles Smith, Safety Coordinator for the Ithaca Gun Company, and Professor J. James Jehring, faculty member of the New York State School of Industrial and Labor Relations, observe the graphic presentation of the reduction of eye accidents following the showing of a film on eye safety.

SAFETY CELLULOID

By NANCY BARONE

Have you considered using a film as an aid in reducing your industrial accidents? The New York State School of Industrial and Labor Relations, in cooperation with the Ithaca Gun Company, reduced eye accidents 75% by a safety program built around a film.

"THE experience at the Ithaca Gun Company is an example of how industry's safety programs can benefit from the use of visual aids. The showing of a film, with the proper introduction and follow-up, can accomplish within a short time what might otherwise have taken many months," stated Professor J. James Jehring, faculty member of the New York State School of Industrial and Labor Relations, in describing the success of the program.

Professor Jehring, with the enthusiastic approval of Mr. Charles Smith, Safety Coordinator for the Ithaca Gun Company, had been showing foremen training films at the company's monthly foremen meetings.

"You know, it's a funny thing," Safety Coordinator Smith says, "but for a number of years before I came with the Ithaca Gun Company, I was an airline pilot. Most people think of pilots as being people who take chances. On the contrary, practically all of my education with the airlines had just one theme: *how not to take chances.* They even showed us that there was a right and a wrong way to tune a radio!"

"The Plant Safety Committee at the Ithaca Gun Company has tried to be guided by that same principle; educate workers to the fact that there is a safe and an unsafe way to accomplish even the most trivial act connected with their jobs. Furthermore, pictorial education has proven to be the most effective way of bringing this fact home. Sound motion pictures, furnished largely by the New York State School of Industrial and Labor Relations at Cornell, are a big factor in our pictorial safety campaigns."

Preventing Eye Accidents

Since the Ithaca Gun Company's main industrial accident problem was eye injury arising out of the employees' failure to wear safety glasses and goggles, Professor Jehring devoted one meeting to showing the film, "To Live In Darkness."

The foremen of the company were impressed with the message it had to offer. They requested that the film be shown to all the employees in their departments.

This was the beginning of a safety program which was built around the film, "To Live In Darkness." The film, produced by 20th Century Fox for the United States Navy, was a winner of the National Safety Council Award in 1945. It effectively tells the *(To page 53)*

A SAFE OFFICE

By JOHN N. COSGROVE
The American Insurance Group

THE average business office is considered a haven of safety. This is an entirely erroneous notion. While an office is relatively safer than occupancies where hazardous processes are a part of normal operations, nevertheless, numerous unsafe conditions and accompanying practices can be found in every office.

Expressing the hazards in terms of the various persons to be found in the average office, let us begin with that great American institution, the office boy.

The Office Boy

This young man is often called upon to perform tasks which seem to be discouraging avenues to the presidency of the company. For example, he must carry supplies, heavy ledgers, typewriters, office machines and other objects from time to time. The office boy should be instructed in proper lifting methods and forbidden to lift any object that could possibly tax his strength. If any load is too heavy he should ask for assistance. Of course this advice applies to any other person in the office as well.

In lifting, the main support must come from the legs and not from the back. A safe practice is to bend the knees, keeping the back as straight as possible, grasp the object to be lifted, and arise slowly.

The task of opening packages, cutting paper and sharpening pencils usually falls to the office boy. Invariably he will use a razor blade for these purposes. He will keep a small supply of blades, usually in the disarranged center drawer of his desk where anyone, himself included, can thrust a hand in and sustain the nasty type of cut razor blades inflict. Razor blades should be forbidden equipment in every business office.

Often the office boy and other personnel must handle a paper cutting machine. In every case they should receive complete operating instructions and should be warned to make sure that the proper mechanical guard is in place before using the machine.

Office boys, secretaries, clerical help and executives handle a volume of paper work. The handling of paper presents seemingly negligible but definite hazards. Paper cuts can be most unpleasant. To avoid them, pick up papers at the corners, not at the sides, top or bottom. If a paper cut is sustained, immediate cleansing and first aid are in order to forestall infection.

Unsafe Flooring

All personnel are constantly exposed to slipping, tripping and falling. Where any floor surface such as linoleum or other slick material is present, slip-retarding agencies should be applied.

Broken, cracked or splintered flooring should be immediately repaired. Uneven flooring is particularly dangerous to female office employees, especially now that the "new look" style in dresses accompanied by the usual high heels is the vogue.

This style combination is also highly dangerous in traversing stairs. All employees should be cautioned to use hand rails at all times when using stairs. Management's obligation is to provide adequate lighting, and non-slip stair treads where necessary. Running, skylarking, and horseplay should be discouraged and overcrowding prevented by dismissing employees at staggered intervals for luncheon periods and at the day's end.

Careless arrangement of electrical extension cords can cause serious tripping and falling accidents.

Continuing this analysis of the highlights of business office hazards, we turn our attention to inanimate objects which are a threat to personnel.

Furniture Hazards

Neglected furniture often presents sharp edges. Where surface finishing has worn off, rough areas are a danger. Cuts and splinters are often the result. Immediate

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repair of all worn furniture is a "must."

Uneven surfaces on metal filing cabinets and similar furnishings are often found. Any projections of metal should be removed, as they not only cause injury but often snag clothing and rip materials in a manner that is difficult to repair.

Office machines have become an increasingly important part of office operations. Many of these machines are electrically operated. It is obvious that office workers are not, on the average, mechanically proficient operators of machinery, and office machine manufacturers have recognized that fact by providing every possible safeguard. Nevertheless, no person should be permitted to operate office machinery without prior instruction. In no case should anyone but a skilled mechanic be allowed to repair any mechanical devices. This is particularly important in the case of power operated machinery. Attempts by unskilled persons to repair office machinery while the apparatus was still in motion have resulted in serious injuries. All machines should be disconnected before cleaning.

Chairs should receive periodic inspection for weaknesses, and should be discarded or repaired when found to be a threat to personnel or visitors.

Use a Ladder

All personnel must be warned against standing on chairs or other insecure foundations to reach objects at a height. Caution is also necessary in placing drawers, small index files or other objects on the top of file cabinets where they may fall on a person working below. Management should purchase the best equipment possible to insure good posture and comfortable working conditions. All personnel should be taken into the confidence of the management and told that a joint effort will produce safer and more pleasant conditions for the entire staff. Office workers will be pleased to cooperate and report dangerous conditions once they understand that safety measures, in the last analysis, are chiefly for their own benefit.

In addition to the foregoing factors which contribute to personal injury, we have the omnipresent fire hazards in business offices.

Fire Hazards

Employees often keep matches in desk drawers in close proximity to papers. If smoking is permitted, ash trays should be provided and their use insisted upon to prevent the pernicious habit of tossing cigarette, cigar stubs and matches into wastebaskets or upon the floor.

In line with good housekeeping, throwing of waste paper on floors should not be tolerated. Janitors and handymen should be compelled to keep storage closets in good order and not allowed to keep hazardous cleansing materials in haphazard locations. All oily mops should be safely stored, and all waste and oily rags promptly removed from the premises.

From "The Boardcaster."

How to Engineer Machines for Their Operators

THE title of a new book, "Applied Experimental Psychology" is somewhat unfortunate, for this is no theoretical, jargon-infested discussion of man's actions and reactions. Much more to the point is the subtitle, "Human Factors in Engineering Design." Authored by Alphonse Chapanis, Wendell R. Garner, and Clifford T. Morgan, all of the Psychology Department at Johns Hopkins University, this volume deals with the engineering of machines for human use and the engineering of human tasks for operating machines.

The modern machine has become an increasingly complex affair, and this book shows the results of experiments to determine the capacities and limitations of people as machine operators. More important, it shows how these results can be applied practically to machine design and to the operating environment. Special emphasis is given to the problems of how we see, hear and move. These broad questions lead to recommendations for designing dials, instruction plates, and controls, the use of signaling devices, how the work should be arranged in space, the relation of working and resting, and creating a suitable working environment.

The authors are to be commended for avoiding any display of erudition. The book is written simply, clearly and to the point. Pictures, diagrams and charts add to the clarity of the exposition. It is published by John Wiley & Sons, Inc., 440 Fourth Ave., New York 16, N. Y., at $4.50 per copy.

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This is an official U. S. Treasury advertisement prepared under the auspices of the Treasury Department and The Advertising Council.

TRANSPORTATION

When Trucks Are Buses

TRUCKS are being widely used for the transportation of workmen about the job, from one job to another, and to and from their homes. Special precautions should be taken when trucks are so used. For example, the Industrial Accident Commission of the State of California has definite orders concerning this practice:

(a) Trucks used for regular transportation of workmen shall be constructed for that purpose by providing seats, and railed in on all four sides. The brakes shall be tested daily. The tailgate shall be closed and secured in position.

(b) Workmen shall not be transported in dump trucks unless the body is locked.

(c) Workmen shall not ride on trucks with their legs hanging over the sides of the body of the trucks.

(d) Workmen shall not ride on top of loads that may shift, topple over, or become unstable.

(e) All loads shall be secured against displacement.

Death Strikes at Night

TWO to three times as many persons are killed in night traffic accidents in America's street light-deficient cities as in daylight, a new survey by The Street and Traffic Safety Lighting Bureau reveals.

The survey covers the six-month accident experience of 91 major cities in 34 states and shows that deaths per accident are three times as high at night as in the daytime.

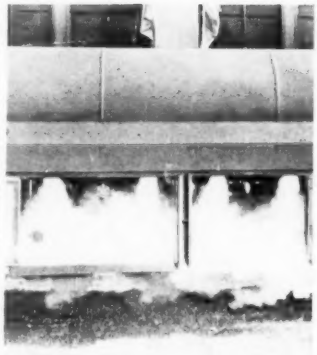
Of 73,952 night accidents, 609 were fatal compared with 366 of 127,608 for daylight. In other words, night accidents which accounted for only 37 percent of the day-night total caused 63 percent of the deaths.

Eight cities reported *all* deaths resulted from night accidents. Twenty-seven showed night deaths at least *three times* day deaths. Thirty-nine cities revealed night deaths at least *twice* day casualties.

Only 21 of the 91 cities reported fewer deaths at night than in daylight.

A steadily increasing number of cities, the Bureau says, are attacking the high death rate of night accidents by improving their street lighting.

Fire Protection for Gas Trailer-Truck



Trial discharge of installation in trailer pump compartment shows dense, fire-smothering cloud of carbon dioxide that floods the hazards space.

A 4120-GALLON trailer-truck, recently put into liquid petroleum gas transport service in the East, has two built-in carbon dioxide fire extinguishing systems protecting both the tractor engine and the trailer pump compartment.

The six-wheel Mack tractor is powered by a 150-horsepower gasoline engine. The single-axle, four-wheel trailer it hauls carries two long tanks—each with 2060-gallon capacity—and an undercarriage pumping compartment.

Directly behind the driver's cab is a 20-pound cylinder of compressed carbon dioxide equipped with automatic discharge head, mounted on an angle iron frame. The release valve mechanism is connected by copper tubing to two fire detectors under the tractor engine hood. Rigid piping leads from the cylinder discharge head to perforated tubing that surrounds the engine, and to two nozzles at engine bed level.

Automatic fire protection for the trailer pump compartment consists of two 35-pound cylinders of carbon dioxide with similar connection to 6 fire detectors and 10 discharge nozzles. Nozzles are arranged along the sides of the pump compartment near the top, directed downward to concentrate discharge of carbon dioxide "snow" on the pump strainer.

As an added safety feature, the system has provision for manual releases. The single cylinder near the cab, serving the engine compartment system, can be discharged by pulling a lever on the cylinder's pneumatic control head. The double-cylinder pump compartment system can be released from either of two remote control pull handles located on the trailer sides above the rear wheels.

In case of fire in the engine or pump compartment, the detectors automatically release inert, fire-smothering carbon dioxide gas that engulfs the fire space, and quickly extinguishes the blaze without causing damage to the engine or pump equipment. Two nozzles under the engine throw a protective blanket of carbon dioxide on the roadway to prevent spread of spill fire.

Picture by courtesy of Walter Kidde & Co., Inc.

Research Into Motor Transport Accidents

Part 2

By DR. ROSS A. McFARLAND
Harvard School of Public Health

A research program for preventing motor transport accidents is being conducted by the Harvard School of Public Health. Here are some of the things research is trying to do and some of the factors contributing to highway accidents which the program has already uncovered.

(Part 1 of this article appeared in the November issue of SAFETY ENGINEERING)

The Selection of Drivers

There are two chief aspects of selection. One concerns *psychological fitness*, including mental ability, aptitude, and temperament, and the other *medical fitness* as it relates to the tasks to be performed, including such variables as fatigue, momentary lapses of attention or loss of consciousness, and age. It is rather surprising that so little data are available in regard to what is expected of a truck or bus operator, objective methods of appraising his capabilities and possibilities to error, and follow-up studies of his success.

In regard to *psychological fitness*, there is only time to discuss one interesting problem, namely, the question of accident proneness, about which so much has been written and so little known. Psychologists are now generally agreed that "accident proneness" may safely be defined only in terms of the *relative frequency of accident occurrence when differing exposure rates have been equated.* An individual may be said to be "accident prone" when he has demonstrated that he has had significantly more accidents than his associates who have had equal degrees of risk or exposure. There is often a temptation to go further and define an "accident prone" individual in terms of inherent qualities which make him more than normally liable to accident occurrence. The evidence thus far does not permit such a definition, and defining "accident proneness" on any other basis than frequency (with equated risk) is highly unwarranted.

The search for characteristics of those who may turn out to be poor accident risks has not met with conspicuous success. The evidence in support of identifying traits comes from two fields of study; (1) The results of psychological tests of various kinds administered before employment and (2) clinical studies, involving interviews and/or case histories of individuals who have been involved in repeated accidents. The evidence from the use of tests is far from convincing, and usually the clinical approach must wait until after the individual offender has identified himself very clearly by having a large number of accidents. It would be a negligent or unimaginative psychologist or psychiatrist who could not find mental or emotional defects in anyone whom he carefully examined after having repeated accidents and with whom he compared an ideal norm. Further study is needed to help identify adverse traits in experimental as compared with control groups in order that better predictive results may be obtained.

An unsuccessful attempt to relate physical defects to "accident proneness" is illustrated by a widely quoted study of accidents in truck drivers. The study contended that drivers with low blood pressure were more susceptible to accidents. The conclusion was based upon the observation that 26 accident-free drivers had a mean blood pressure of 129/78 while 26 accident-repeaters had blood pressure of 106/65. The control of the experimental procedures and the error of obtaining the records as well as the statistical treatment of the data leaves one unconvinced of the conclusion reached. The literature is full of similar investigations and few permanent conclusions can be drawn from such studies.

There is great need for additional study as to what constitutes *physical fitness* in regard to operating a bus or a truck. Careful studies of accident records of drivers do not show high correlations with certain physical defects as revealed in the medical examinations. This is related to the fact that the various tests and items are either not related to the specific duties which the driver must perform or the tests are not reliable ones. The physical examinations should be revised on a functional basis. In other words, after the critical components of the driver's job is understood it should then be possible to

appraise those traits or functions. A few illustrations may make this clear.

In a large trucking company, a safety director noticed that one of the drivers was finishing his runs in a very nervous state and that his eyes were inflamed and irritated. Investigation revealed that although he was markedly myopic, his blurred vision had not been a handicap on day runs in uncongested areas. Shortly before the symptoms began, he had been shifted to a night run in heavy traffic. Realizing his handicap, he obtained corrections which were improperly fitted, thus aggravating his condition. Later he was sent to an ophthalmologist and refitted after which both his physical problem and nervous tension disappared. The defect in question was not related to poor night vision (retina) but to adaptation to low illumination due to an abnormality in the lens of his eyes which could be corrected. A routine health maintenance program would probably have detected his difficulties much earlier, permitting corrective action to be taken, thus eliminating or reducing the period during which the driver was on the road in an unsafe condition.

Inattention

One of the most important areas which should concern both the physician and the psychologist relates to the basic causes of lapses of attention, distraction, or temporary loss of consciousness. In many serious accidents on the highway, loss of attention may occur because of over-eating, excessive fatigue, or hypnotic effects from monotony in which the driver either experiences a loss of attention or may actually momentarily fall asleep. In some cases, preoccupation due to worries or personal maladjustment may be at fault. Finally, loss of consciousness may result from defects of the central nervous system due to a history of head injuries or epilepsy, advanced heart disease with defects in circulation to the brain, or diabetes with marked abnormalities in blood sugar. A wide variety of factors may cause syncope, fainting, or loss of consciousness, but often the basic causes are not revealed in the physical examination.

In a democracy, we are loathe to put restrictions on citizens in regard to what they can and cannot do, and it is not my purpose to suggest that every person should have a physical examination in order to drive an automobile. But there is much to be said for a careful physical examination of those operators of trucks and buses who are professionally engaged in such work. If health maintenance examinations are carried out routinely and thoroughly, it is only the very occasional person who is either *eliminated* because of acute illness, while many are made safer and their useful lives prolonged if defects are detected early enough to correct them.

As an illustration, consider the case of the Boston streetcar driver who was a patient of the late Dr. Soma Weiss, a specialist in the field of circulatory diseases and fainting attacks. The streetcar conductor had fainted at a particular corner on his run on several different occasions. Certain aspects of his behavior suggested that this was a good psychological case in which a conditioned response or an emotional factor was involved. Dr. Weiss amazed his staff by asking to see the man's collar. He established the fact that when the conductor turned his head at the corner to look back for approaching traffic, his high collar stimulated the bundle of nerves (carotid body) in his neck which controlled the blood supply to his brain. The man was put back to work with a low collar and had no further difficulty. This is what is meant by corrective action based on insight into the physical condition of the operator.

Operational Aspects of Fatigue

In recent years, we have devoted a great deal of attention to the problem of fatigue in pilots and in others engaged in the operation of machines. Unfortunately, this phenomenon cannot be precisely described in physiological terms or directly related to accidents. For example, in the case of truck drivers, the frequency of accidents does not peak up toward the end of runs but toward the beginning or after they had been on the road for only 2 or 3 hours. This suggests that preoccupation or factors other than fatigue are involved. On the other hand, there is some evidence to suggest that a long tour of duty, certain operating practices, or emotional stresses may give rise to a deterioration in skill, or what has been called skill fatigue.

Various experimental studies have shown that the early signs of *skill fatigue* are as follows: (1) a tendency to require larger than normal changes in the stimuli before action is produced, (2) a retraction in the normal span of anticipation, (3) inaccurate timing of control movements, and (4) increased sensitivity with more aggressive action both towards people and towards the machine being operated. One of the most interesting characteristics relates to the fact that the *fringe skills* or subtler reactions which usually operate unwittingly are lost, and more effort and attention are required to carry out the tasks successfully. Finally, there seems to be a loss of insight into the extent and nature of the deterioration, and the operator is unable to judge the extent of his deterioration. Such behavior naturally forms the basis for errors or accidents.

Ageing and Accidents

Not many months ago, a bill was introduced into a state legislature to limit the licensing of aircraft pilots to those who are 50 years of age or younger, following a fatal accident to a private pilot who was over 60 years of age. Whether an arbitrary age should be set for the retirement of truck and bus operators is a question which has been widely discussed from time to time. In my opinion, there is no satis-

factory evidence to warrant an arbitrary retirement age. Functional age or the ability to perform duties is far more important than chronological age. Furthermore, there is a great deal of evidence to suggest that the older drivers are as safe or possibly safer than the younger ones. Such an investigation was carried out in Connecticut, and the results tended to favor the older drivers even when differences in exposure were controlled. There is great need for further study of the changes with age which may influence performance in driving.

If further research is directed toward understanding the changes which occur with age, it might be possible to utilize the older driver safely. In addition, it would be possible to instruct him in regard to compensating for his deficiencies and place him on jobs for which he is suited. No better illustration can be given than the results which we have obtained in studies of light sensitivity, or ability to see under conditions of low illumination, in relation to age. Older people are markedly handicapped in regard to this function and drivers over 60 or 65 years of age might be confined to day rather than night runs in order to utilize their abilities without hazard to others.

Conclusions

The conclusions to be drawn from these remarks are as follows. There is no single causative factor in regard to motor transport accidents. Further reductions can be brought about only by increased vigilance and research in regard to the design of equipment, the selection and training of personnel, and safer operating practices. Advance analysis of errors and the prevention of accidents involves the teamwork of a group of scientists representing various disciplines with practical truck and bus operators who are concerned with the routine scheduling and maintenance of their vehicles.

From an address presented at the 28th Annual Massachusetts Safety Conference.

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MICROTRIP Control is a new two-hand electrical control for a wide variety of operating mechanisms on power-operated equipment.

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ARTHUR C. CARRUTHERS ANNOUNCES NEW AFFILIATION

ARTHUR C. CARRUTHERS, consulting editor of SAFETY ENGINEERING, now retired, announces his new affiliation with United Insignia Co., Inc., as Vice President in charge of Safety Service, with offices at 80 Nassau St., New York 7, N. Y.

For more than 30 years, Mr. Carruthers has been associated actively with the development of the safety field in this country. In his former capacity as editor of SAFETY ENGINEERING, Mr. Carruthers was a member of important national and local safety committees, in demand as a speaker at meetings and over radio stations, and served as first secretary of the New York Safety Council. He also participated in the organization of the safety equipment manufacturer's association and the National Safety Council.

In his new capacity, Mr. Carruthers will devote his time to the development of safety campaigns featuring awards in the form of plaques, emblems, and trophies. His host of friends will be glad to know of his continued close activities in behalf of the field with which he has been so long identified.

Teach Them to Lift

LIFTING know-how does *not* come naturally. Thousands of workers every year suffer strains or hernias from the simple process of picking up and putting down, according to the Bureau of Labor Standard's new booklet—"Teach Them to Lift."

Workers must be trained in safe lifting, and many tricks of the trade are told in this publication. Popular in style and amusingly illustrated, it is the second in a new series of safety pamphlets designed for the industrial foreman or supervisor.

"Untrained persons," the bulletin states, "often do a job the hard way. As a result, they have injuries, they soon lose their pep and energy, and they take more time—which 'slows down production.'" Methods are suggested for preventing the types of injuries caused by improper lifting habits, and eight basic questions are given as a guide to the supervisor in teaching workers the proper lifting techniques.

A limited supply of free copies is available from the Bureau of Labor Standards, U. S. Department of Labor, Washington 25, D. C. Quantities may be purchased at 10 cents each from the Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C. A 25 percent discount is allowed on orders of 100 or more.

Traffic Training Courses

COURSES in police traffic training and in chemical tests to determine intoxication will be conducted at the Second Western Institute for Traffic Training January 23–February 10 at the University of California, Los Angeles.

The police course will be conducted January 23–February 3 by the Traffic Institute Northwestern University. Francis P. Lowrey of the Institute's Training Division will be the course director.

Other courses to be conducted during the Institute are:

Analysis and Use of Accident Facts—February 6–10.

Fleet Supervisor Training for Motor Vehicle Accident Prevention—February 6–10.

Pedestrian Protection and Control—February 6–10.

How to Sell Traffic Safety—February 6–10.

Gerald O'Connell, director of training for the Traffic Institute, will direct the chemical tests course, to be held January 30–February 3. He will be aided by Dr. C. W. Muehlberger, toxicologist of the State of Michigan; Lt. Robert L. Borkenstein, chief technician of the Indiana State Police and Lt. Ted R. Smith, Pasadena Police Department.

The Second Western Institute for Traffic Training is sponsored by the Institute of Transportation and Traffic Engineering and University Extension of the University of California, in cooperation with the National Committee for Traffic Training. The latter is a subcommittee of the National Committee for Traffic Safety.

A conference on Traffic for judges and prosecutors will be held January 30–February 3 in conjunction with the Institute. This will be sponsored by the School of Law of the University of Southern California, in cooperation with the Traffic Institute, Northwestern University, and the American Bar Association.

Subjects to be covered in the police traffic training course include: introduction to traffic control, traffic police organization, traffic police administration, accident investigation, traffic law supervision, traffic engineering, safety education, law of evidence, law of arrest, traffic law, uniform and model traffic legislation, safety organizations, and police public relations.

In the chemical tests course, subjects will include: value of chemical tests; physiology of alcohol; obtaining and processing test specimens; objective symptoms and their importance; legal and enforcement problems, plus laboratory work and development of testing techniques.

Detailed information and registration blanks for the Western Institute courses may be obtained from the Department of Institutes, University Extension, University of California, Los Angeles 24, California.

ENCORES OF 1949

The 20 most popular Free Bulletins & Catalogs of the past six months are relisted on page 69.

Holophane Elects VP in Charge of Research

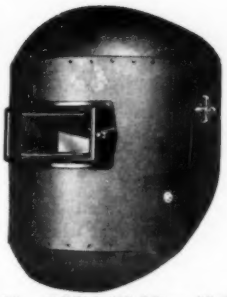
POINTING up the increasing importance of research to modern industry, the Board of Directors of Holophane Company, 342 Madison Avenue, New York, on October 20th elected Henry L. Logan to the newly created post of Vice-President in charge of Research.

Mr. Logan, whose researches in the field of light and vision, his many inventions, and thirty years on the lecture platform have made him internationally known, was previously Manager of the Department of Applied Research.

In his new position he will be expected to put more emphasis on careful research in improving the products, application techniques and marketing practices of the company with the object of creating the greatest possible benefit to the ultimate user.

Mr. Logan is a Fellow of the American Institute of Electrical Engineers and a member of the Board of Examiners of the A.I.E.E. He is also a Fellow of the Illuminating Engineering Society, Chairman of the I.E.S., Committee on Research, a member of numerous other scientific and technical committees; member of the Inter-Society Color Council and an honorary life member of the Instituto Mexicano de Illuminacion.

He pioneered the practice of built-in lighting that is employed so generally today and designed some of the revolutionary lighting installations at the Chicago Century of Progress, the San Francisco World's Fair, and the New York World's Fair. He developed the lighting for the broadcasting industry, first used at Radio City, and is largely responsible for the excellence of modern surgery lighting techniques. He is particularly well-known in university circles having lectured at most of the principal universities of Canada, Mexico and the United States.



No. 244M Welding Helmet with Sel-O-Matic adjustable headgear

Fits closely on head but permits full freedom within the helmet. Full rounded front with flared sides. Top and chin shields curve inward to guard both head and neck against light exposure. Tough fibre will withstand hard usage. Standard equipment includes our adjustable non-absorbent headband, removable leather sweatband and felt covered chin strap. Rivetless lens holder. Write for folder showing complete line of Sellstrom welding helmets and accessories.

No. 364 Dependon Acetate Shield

Has clear acetate replaceable window 6 3/16 x 15 x .040, set in frame of tough fibre for full face protection and long wear.

The window, non-shatterable, is heat, spark and acid resistant. Ideal for chipping, grinding, chrome plating, de-greasing tanks, paint and scale removing, and all similar eye and face hazards.

No. 602 Glamorous Eye Glasses

Especially designed to supply demand for modernly styled eye glasses patterned after the latest prescription frames. Frame is of molded transparent amber color demi-plastic. Temples fastened with optical hinges. By dipping frame or temples in hot water can be bent to fit most faces. Furnished with 42 x 45 mm. drop eye lenses of any required type. Weight only 1⅝ oz. Each pair furnished with a case made of tough, long-wearing plastic in imitation leather. This is a brand new number. If your dealer has not yet stocked this item, write us direct.

Improved

EYE AND FACE SAFEGUARDS

Here are a few of the more than 200 Sellstrom eye and face safeguards. Every one is designed to render utmost protection—combined with lightweight, greatest possible comfort and styled to meet the demands of your workmen.

420 Coverall Welding Goggles

Molded from rugged black "Durez" plastic, abundantly ventilated through lightproof slots in the sides and all around the back of the lenses. Covered chain ball bridge, adjustable for size. This is without doubt one of the most popular and most widely used welding goggles to be found anywhere in the United States. Supplied with any desired 50 mm. lenses.

No. 610 Coverall Welding Goggles

They are new, exclusive, perfectly balanced, unusual in comfort and construction. One-piece frame of tough black plastic, thoroughly ventilated by lightproof vents. Weigh only 2½ oz. Can be fitted with any 50 mm. lenses. Same style companion goggles are No. 611 for grinding and 612 of clear transparent plastic. Write for folder 610 which illustrates and completely describes these three goggles for which there is a real need in every metalworking plant.

50mm. Welding Goggle Lenses in new "Inspection" package

Every pair of welding lenses is packed side by side with die cut window to permit inspecting degree of density and the perfection of matching without removing from package. This is a brand new Sellstrom idea in packaging goggle lenses and is offered as a plus service to all users of goggles. Arrow indicates windows. Ask your dealer to show you this special package.

If your dealer cannot supply you, write us direct. We will gladly tell you where you can find a complete line of Sellstrom eye and face safeguards.

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Ebasco Operating Men "Talk Back"

UTILITY operating men, superintendents of electric lines and power plants, division engineers and gas production men "Talked Back" to company safety directors at the 11th Annual Safety Meeting of associated utility companies of Ebasco Services Incorporated held in conjunction with the National Safety Congress at the Congress Hotel, Chicago, Illinois, October 24–28.

The operating men told the safety people "what's wrong" with the safety programs in their companies and what help they need to do a more successful job at a panel discussion which was led by A. B. Larsen, Supervisor of Safety & Training Division, Commonwealth Edison Company, Chicago.

Among the suggestions made were those dealing with selection of young, healthy employees with good family and educational background, who by nature are mechanically inclined and of even temperament; the training of employees for the work they are to perform and sound personnel policies producing incentive on the part of employees to do a good job; recognition for a job well done; and loyalty to their supervisors and the company. Sincere interest on the part of management and backing of the safety program is a "must." Personal contact and friendship with the men on the job by the safety director was also put forward as an accident prevention aid.

At an earlier session on Monday, Dr. Walter Cutter, Administrative Assistant, New York University, told executives and supervisory employees representing electric, gas and transportation companies in some 38 States who attended this meeting, how to get the best out of supervision. He pointed out that the supervisory employee is the representative of management—the man actually responsible for getting the work out; the key figure in labor relations and the key figure in human relations. He showed how good human relations, good working conditions, discipline, straightforward and "fair" disciplinary measures and high morale all work in favor of reducing accidents, and conversely, he said that where you have a good safety record you will have better morale and better employee-employer relations.

A successful safety program in the Line Department of Detroit Edison Company was described to the gathering by R. P. Douglas, Safety Director and H. L. Gillow, Division Supervisor.

Accident Investigation Dramatized

Another feature of the meeting was a dramatization of an actual accident investigation by a cast including a safety director, a district manager, a supervisor of distribution, an assistant to the president, a safety engineer, a distribution engineer, a foreman, a lineman and a serviceman. The director of this dramatization, which was presented to show how such an investigation should be conducted, was C. J. Rutland, Manager, Claims, Insurance & Safety Department, Texas Power & Light Company.

Following this presentation was a panel session "What's Your Problem?" conducted by H. R. Pearson, Personnel Department Head, Dallas Power & Light Company. Problems on safety, health and the handling of claims were discussed by a vice president in charge of operations, a medical director, a safety director, the head of a claims and insurance department and a vice president in charge of employee and public relations.

Other sessions included "A Safety Man's Clinic" and separate "Round Table" discussions of safety problems connected with electric and gas operations. Safety problems involved particularly in construction jobs were covered by Ebasco construction managers in conjunction with client company representatives at another Round Table meeting.

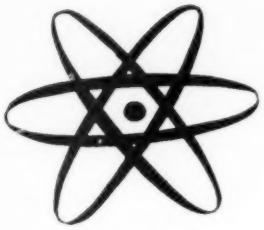
Safety Awards Announced

At Ebasco's Annual Safety Luncheon, R. A. Sharon, General Consultant of Ebasco, announced the results of the annual Ebasco Safety Award presented annually to those companies in the group that achieve an accident record better than the national average accident experience for their particular industry by 25% or more. Texas Power & Light Company, with an injury index 90.78% below the national average for electric companies, and New Orleans Public Service Inc.—electric and gas operations, with an injury index of 87.24% below the national average for electric companies, achieved top honors this year. Other companies in the 25% group include: Superior Water, Light and Power Company, Mississippi Power & Light Company, Birmingham Electric Company, United Gas Pipe Line Company, Columbus and Southern Ohio Electric Company, West Tennessee Gas Company and New Orleans Public Service Inc.—transit operations.

Gold and silver plaques, designed by the internationally famous sculptor, René Chambellan, and achievement certificates were presented to the presidents of these companies at Ebasco's Annual Presidents Meeting later held in New York on December 5th.

At the luncheon, Dr. A. S. Bennion, Vice President of Utah Power and Light Company, of Salt Lake City, addressed the meeting on problems facing the utility industry. Dr. Bennion's address was a masterly exposition of the free enterprise system and of the necessity for defending those principles so vital to the American way of life.

The meeting was conducted by W. T. Rogers, Safety Consultant, Ebasco Services Incorporated, under the general supervision of I. M. Carpenter, the firm's Insurance Manager.



RADIATION PROTECTION

Some of the problems of radiation and the instruments and equipment available for protecting personnel.

By
RALPH P. EAMES

WHAT IS RADIOACTIVITY?

The atoms of any chemical element have a fixed number of electrons whirling around a central nucleus. Every copper atom, for example, has 29 electrons. But the nuclei of some copper atoms may be composed of 29 protons and 34 neutrons, while others may have 29 protons and 36 neutrons. These variations in the number of particles forming the atom nucleus of any element are the different isotopes of that element. The two copper isotopes just described happen to be stable isotopes.

It is possible, however, for scientists to make unstable isotopes in which the nucleus contains a quantity of neutrons different from the number found in the stable isotopes. These unstable atoms have chemical characteristics identical to those of their stable counterparts, and the artificial unstable nuclei tend to change back into a stable form. In so doing, they give off particles and energy rays—in other words, they are "radioactive".

The radiations from various radioactive elements are all different, but they can penetrate solid matter and have an adverse effect on living tissue. The measurement of the effect of radiations on matter is based on the Roentgen (r), which is the quantity of radiation which will produce one electrostatic unit of ions in 1 cc of air under standard conditions of temperature and pressure. One Roentgen represents 83.8 ergs per gram of dry air. It is used for measuring gamma and x-rays.

The Roentgen Equivalent Physical (rep) is the amount of energy absorbed by tissue. One rep equals 83.8 ergs per gram of tissue and therefore is not mathematically equal to one Roentgen. The rep is applied to particle radiations such as alpha, beta, neutrons, deutrons, protons, etc.

HAZARDS OF RADIOACTIVITY

Nuclear radiations are invisible and inaudibile, but in small quantities they are not necessarily harmful. Everyone is daily bombarded by cosmic rays. Persons living in the denser air of coastal regions may absorb 2 r of cosmic rays during their lifetimes, while those in high, mountainous regions may get ten times that amount.

Technicians have for many years known the hazards involved in x-rays and gamma rays from radium; and they have worked out safe methods of protection. Today's radiation problems are similar but more significant, both because of the wider use of radioactive materials and the potentially greater intensities of radiation to be worked with.

From a protection standpoint, the various types of rays—alpha, beta, gamma, etc.—differ in their ability to penetrate matter and ionize matter. It is this ionization which injures living issue. The alpha particle is a positively charged helium nucleus which when slowed down regains its two missing electrons and forms helium gas. Since it is completely stopped by three or four inches of air, a piece of paper offers sufficient protection.

Beta particles are high speed electrons of varying energies. In general, they produce less ionization in matter than alpha particles but are more penetrating. Common substances, such as a one-inch thickness of wood, will completely absorb the hard beta rays, while the soft beta radiation from isotopes such as C^{14} and S^{35} can be stopped by a piece of heavy paper.

Gamma radiation has great powers of penetration. High energy gamma will not be wholly absorbed by even a foot of lead, while low energy gamma may be safely absorbed by 3/16 of an inch of lead. Gamma itself does not ionize matter; but when it strikes a gas, liquid or solid, the radiation ejects photoelectrons which do ionize.

Neutrons are uncharged particles which will ionize certain materials indirectly. When they strike matter containing hydrogen, lithium, beryllium, boron or several other elements, they render the material radioactive by a neutron irradiation process. This process may take place in the body, causing parts of it to become radioactive. Neutrons are classified according to their energy levels as fast, slow, and thermal, the last having a very low energy level.

Although the different radiations vary in their capacities for penetration and ionization, they all act alike in that this ionization will injure living tissue. Radiochemical technicians are faced with two kinds of radiation hazard: ex-

ternal and internal. Internal radiation refers to that from radioactive particles within the body itself. The material may have entered the body through ingestion by breathing contaminated dust particles, by absorption through the skin, or by a break in the skin. Internal radiation is complicated by several factors. For example, plutonium is highly dangerous even though, being mostly insoluble, only very small amounts can be absorbed into the body. Some soluble materials such as radiosodium will be absorbed throughout the body, while others such as radioiodine will become concentrated in one part of the body. Some can be eliminated from the body through natural processes in a short time. Others which are absorbed by bones may stay in the body for years. Certain radioactive materials have a half-life of only a few hours; while others remain dangerously radioactive for thousands of years.

External radiation comes from a source outside the human body, such as an x-ray tube, cyclotrons, radium, or radioactive samples. Protection against external radiation is a question of shielding the body from the rays, keeping a safe distance away from the rays, and limiting the time one is exposed to the rays.

It has been estimated that a person receiving 450 r of gamma radiation in one dose would have only a 50-50 chance for survival, while if the 450 r were given in small doses over a period of years, there would be no serious adverse effects. Similarly, the area of exposure is an important factor because a heavy dose of radiation on a very small area of the body may not adversely affect the body as a whole, while a much smaller dose given to the whole body would be lethal.

Research and experience have shown that the average person can take a daily dose of 1 r indefinitely without visible injury. However, to be on the safe side in setting a standard limit for x-ray technicians and atomic energy workers, some authorities have set the limit of exposure at 0.1 r per day for continuous exposure, while others favor a limit of 0.3 r per week. In addition, special permissible limits have been set for some of the more commonly used radioactive materials used in medical therapy.

RADIATION INSTRUMENTS

Each of the more than 600 radio isotopes of the 96 elements has its own decay scheme. During the process of an unstable atom's returning to a stable state, various kinds, amounts and energies of radiation are emitted. Consequently, in the monitoring of nuclear operations, three distinct phases of the radiation are investigated: 1. detecting (or "scanning" or "surveying") for the source of the radio activity, 2. analysis of the radiation into its component parts (alpha, beta, gamma, neutron, etc.), and 3. measurement of the intensity of the radiations.

Many commercial instruments are available today formonitoring purposes. Any one instrument is likely to perform more than one of the three monitoring functions described above. There are, however, very definite purposes for which each type of instrument can be used to the greatest advantage. Factors to be considered include the location of the radioactivity, the kind of radiations and energy levels involved, and the reason for investigating the radioactivity.

For purposes of classification, Radiation Protection Instruments have been divided into five categories: 1. Geiger Scanners, 2. Ionization Chamber Meters, 3. Personnel Dosage Meters, 4. Counters, 5. Shielding and Handling Equipment. Of these five groups, the first three are for complete monitoring devices. The fourth group, "Counters", is devoted to accessory and component equipment which can be used to make special monitoring set-ups. It includes gas flow meters, Geiger tubes, scalers, and specialized counters.

Under "Shielding and Handling Equipment" will be found various types of lead bricks, shields and containers, and also remote control and automatic handling equipment.

Special attention should be given to the first two groups: Scanners (which are Geiger tube instruments) and Meters (which are ionization chamber instruments). They are basic monitoring devices, but vary fundamentally in principle and construction as well as in application.

Geiger tube instruments respond to each individual particle which enters and ionizes the tube. They are suitable for low ranges of radioactivity; but at higher ranges, the detection of particles becomes so frequent that the Geiger tube is saturated with pulse-responses and ceases to function properly. The Geiger tubes are much more sensitive to beta than to gamma, so that even a small amount of beta is likely to produce a disproportionate response. For health survey purposes, therefore, Geiger instruments are suitable only for radium, to which all such instruments are calibrated.

Ionization chamber instruments, instead of distinguishing between individual particles, indicate the ionizing quality per unit path length of the radiation which they intercept. They are less sensitive than the Geiger tube instruments at lower ranges, but will detect higher ranges than is possible with Geiger tubes.

Under "Personnel Dosage Meters" will be found various laboratory and personal devices for checking the radiation dosage to which personnel have been subjected during the working period. Included are laboratory accumulators, dosimeters, pocket chambers, x-ray meters and film badges.

Radiation protection is a complicated procedure in "hot" laboratories such as those of the Atomic Energy Commission. But for many intermediate and small installations, radioactivity is no more hazardous than many toxic and explosive materials which industry has been using for years. Instrumentation is only one phase of radiation pro-

tection. Of primary importance is the need for personnel having a proper realization of the characteristics of the materials being handled. No radiochemical laboratory will be any safer than the people working in it.

To attain safety in radiochemical work, consideration must also be given to the layout of the laboratory, construction materials, design of shielding equipment and exhaust hoods, monitoring of air for radioactive dust, protective clothing where needed, selection and training of personnel, transportation of radioactive materials, and the disposal of radioactive wastes. For persons desiring assistance in radiation problems, the Bureau of Standards will supply a list of technical consultants.

Manufacturers of radiation protection instruments have not reached agreement on standard names for the various kinds of devices. The names used in this article are for purposes of classification only. Readers wishing to know the names of the manufacturers of any of this equipment may obtain this information by writing to the Editor.

GEIGER SCANNERS

The primary purpose of Scanners is to detect radioactivity. As Geiger-tube instruments, they are most suitable for low range radiations. These instruments cannot analyze the radiation, but filters can be used to shut out unwanted rays. Typical applications are for detecting radioactive ores, for locating residual contamination of laboratory equipment and clothing, for checking smear tests and boxed radioactive materials, and for measuring radiations from radium, gamma. or low ranges of radioactivity.

SCANNER—ALPHA—PORTABLE

A battery-powered portable instrument for detecting alpha particles in the presence of other radiation. The hand-held probe facilitates scanning of table tops, hands and equipment. The presence of alpha radiation causes a popping in the earphones, or is shown visually on a dial with a range of from 0 to 20,000 counts per minute.

SCANNER—BETA, GAMMA—LABORATORY

Operating on AC, this instrument is used for routine checking for small amounts of contamination below tolerance dosage level. The pulses for an end-window Geiger probe are shown visually by a rate meter with ranges of 200, 2,000 and 20,000 counts per minute, or they may be amplified for a built-in loudspeaker. It responds to even the very low beta radiations such as C^{14} and S^{35}. It is useful for monitoring equipment, clothing and hands, especially to prevent ingestion of small amounts of bone-seeking radioactive materials. For "hot" laboratories, the scanner is used to determine changes in the background counting rate.

SCANNER—BETA, GAMMA, X—PORTABLE

Designed for general survey work and locating low intensities of radioactivity, this battery-powered detector will respond to beta, gamma, and x-rays. The Geiger tube is located in a hand probe whose output is measured by a pulse amplifier. Visual indication of the presence of radioactivity is given on a scale calibrated at 0.2, 2, and 20 mr per hour from radium gamma radiation. Beta response can be measured at 1,000, 10,000, and 100,000 counts per minute. Headphones can also be used. Applications include mineralogical surveys, locating leaks, checking apparatus for small contamination, following tracer elements, etc.

SCANNER—BETA, GAMMA, X—PORTABLE—FLASHING

A battery-powered instrument for contamination surveys, ore prospecting, and demonstrations. The scanner may have probe; but, since it is light in weight, the whole instrument can be easily moved over the suspected area. Response to beta, gamma and x-radiation is indicated by a flashing light, the rate of flashing being proportional to the intensity of the radiation. Earphones may be used if desired.

SCANNER—GAMMA—PORTABLE

A battery-powered survey instrument for determining gamma and cosmic radiations. It can be used for locating radioactive ores and checking laboratory contamination. Response is given audibly by means of earphones. Light weight makes it easily portable. Probe is often sheathed in metal to withstand rough usage.

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IONIZATION CHAMBER METERS

These Meters are for detecting radiations at dosage tolerance levels. These ionization chamber instruments are also designed either to respond to only one type of radiation or to be able to discriminate between the various types by means of filters. Some will also give accurate measurement of the intensities of the rays. These meters should be used for health surveys, laboratory monitoring, and checking shipments of radioactive materials.

ELECTROSCOPE—ALPHA, BETA, GAMMA—PORTABLE

A battery-powered instrument the Lauritsen Electroscope utilizes a quartz fiber in an ionization chamber. Various types of shields may be used to differentiate between alpha, beta, and gamma radiations. With a timing device, dependable measurements of intensity can be obtained. Calibrated for gamma dosages of 200–2,000 mr per hour.

METER—ALPHA—PORTABLE

A battery-powered instrument, sometimes called "Zeuto", for detecting and measuring alpha radiation by means of an ionization chamber and amplifier circuit which operates the rate meter. The range is 6,000 to 60,000 disintegrations per minute. It is suitable for the rough measurement of alpha radiation from flat surfaces as well as for detecting alpha contamination.

METER—ALPHA, BETA, GAMMA, X—LABORATORY

An AC-operated instrument for detecting and measuring alpha, beta, gamma, and x-rays; and the beta shield permits distinguishing between hard and soft radiations. The ionization current is measured by a DC amplifier for five operating ranges of from 20 to 2,000 mr per hour. For protection of personnel in hospitals, laboratories, and industries using x-rays or radioactive materials.

METER—BETA, GAMMA, X—PORTABLE

A hand-held survey meter survey that can distinguish between beta and gamma radiation, and is used for checking high intensity sources. Different versions of the instrument are designed for various gamma dosage rates. They can be calibrated for beta. For analysis purposes, a plastic shield may be used to cut out the beta.

Four general dosage ranges are available as follows:

20, 50, 200, 500, 2,000 mr per hour

25, 250, 2,500 mr per hour

40, 400, 4,000 mr per hour

1–20,000 mr per hour

METER—GAMMA—ALARM—LABORATORY

An AC-operated meter with an alarm for the visual and audible warning of excessive radiation dosage. Dial gives constant indication of the intensity, and as soon as the intensity exceeds the safe tolerance level of 0.1 r per day, an alarm sounds automatically. In one type, the alarm is intermittent, with the frequency of the alarm proportional to the radiation-intensity, and becoming continuous at 0.14 r.

METER—GAMMA—PORTABLE

A light-weight, battery-powered device for detecting gamma radiations in laboratories and in the field. The operating range is shown visually on scales of 5, 50, 500, 5,000 and sometimes 50,000 mr per hour. The detection unit, a hermetically-sealed ionization chamber, is built into the instrument.

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PERSONNEL DOSAGE METERS

These are devices for checking radiation dosages to personnel. They are chiefly of the accumulative type to indicate the amount of radiation personnel have received during the working period.

ACCUMULATOR—LABORATORY

An AC-operated instrument which can be used as a meter for measuring alpha, beta, gamma, and x-rays or as an accumulator of scattered radiation around a laboratory. The visual scale will indicate an accumulated reading of 100 mr, and provisions are made for the attachment of a recorder or alarm. Personnel in radioactive and and x-ray operations are warned against overexposure to radiations.

ACCUMULATOR—PORTABLE

A battery-powered instrument to measure scattered radiation accumulatively. It consists of an ionization chamber containing a sealed-in electrometer tube. The visual scale is calibrated from 0 to 200 milliroentgens. The standard daily tolerance dosage of 100 mr is at midscale. Useful as a check on the accumulated radiation-exposure of nuclear and x-ray technicians.

CHARGER READER—POCKET CHAMBER

A metering instrument which is used to charge pocket chambers and also to read them for accumulated radiation exposure. The voltage change in the pocket ionization chamber is indicated on the charger-reader directly in roentgen units. The charger-reader may be used for both the gamma, x-ray pocket chamber and the slow neutron pocket chamber. (See Pocket Chamber)

CHARGING UNIT—DOSIMETER

A compact water-proof unit which is used as a voltage and light source for charging pocket dosimeters. When the dosimeter is inserted in the socket of the charging unit, the fibre image can be set at zero on the dosimeter scale. Any number of dosimeters may be used with the charging unit. (See Dosimeter)

DOSIMETER—GAMMA, X-RAY

A pen-size monitoring device to be attached to the clothing of each person working with radioactive materials or x-ray equipment. It provides a constant check on the accumulated dosage he has received and can be read on the spot by pointing the instrument at a light source. The full scale sensitivity is 200 mr. Other high-range dosimeters are available with scales of 10 r, 50 r, and 100 r. (See Charging Unit—Dosimeter)

POCKET CHAMBER—GAMMA, X-RAY

A pen-size ionization chamber for monitoring personnel exposed to gamma or x-radiation. When clipped to the clothing, the chamber provides a continuous record of the radiation dosage to which the wearer has been exposed. The device is charged and the exposure-level read on an accessory instrument, the charger-reader. Because the daily tolerance level is 0.1 r, most pocket chambers have a full capacity of 0.2 r as an added factor of safety.

POCKET CHAMBER—SLOW NEUTRON

A pocket ionization chamber which is lined with boron to make it sensitive to slow neutrons. The chamber may be clipped to the clothing to provide a record of the total exposure to slow neutrons. For charging and reading, an external device is necessary. (See Charger Reader)

FILM BADGE SERVICE

Film badges are small packets of dental type film which are pinned to the clothing of persons exposed to radiation or x-ray hazards. The film badge service supplies sets of badges, processes used badges, and makes a radiation dosage report of the results. Two types of film badges are available:

RADIOACTIVITY BADGE: The radioactivity badge contains a highly sensitive film for dosages up to 2 r and also an insensitive film for dosages up to 30 r. A cadmium filter covers part of the badge to give a measurement of gamma rays. The unfiltered portions of the films will indicate the softer radiations.

X-RAY BADGE: The x-ray badge utilizes the same types of film as the radioactivity badge, but also contains a copper wedge of stepped thicknesses to overcome the differences caused by varying kilovolts. The X badge is also carefully shielded on the non-exposure sides to prevent x-rays from entering the back of the badge.

METER—ALPHA—HAND MONITORING

A laboratory device designed specifically for the monitoring of the hands of personnel for alpha contamination. The instrument consists of two alpha-sensitive counters, arranged so that the hand can be inserted between them, and an indicating electronic circuit calibrated to read from 0 to 20,000 counts per minute.

METER—BETA, GAMMA—HAND & FOOT MONITORING

A unit instrument designed to check the hand and feet of nuclear workers for contamination by beta and gamma. The platform has two inset grids on which the feet are placed. Two openings on the upright part of the equipment are for checking the hands.

METER—X-RAY

An instrument designed to measure a predetermined quantity of x-radiation. It is especially suited to checking the x-ray dosage received by a patient. A sensitive ionization chamber is mounted on a flexible arm of a portable pedestal for exact positioning in the x-ray beam or may be detached for locations otherwise inaccessible. A predetermined dosage rate of from 0 to 500 roentgens may be selected; and when that level has been reached, the meter will indicate it by pilot lights and by sounding a buzzer, and will automatically shut off the x-ray beam.

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COUNTERS

Accessories and parts, such as Geiger tubes, scalers, etc. with which specialized monitoring equipment or sample-checking equipment can be made.

COUNTER—GAS SAMPLE

A glass-wall tube designed for counting radioactive isotopes in the gas phase. The tube has a volume of 250 cc and is particulary useful for C^{14} measurements.

COUNTER—LIQUID SAMPLE

A counter tube designed for measuring the radioactivity of liquids. The glass tube has a thin wall section and can be dipped into the solution to be tested. A plug base permits easy mounting at the end of a cable for portable counting work.

COUNTER—SCREEN WALL

A very sensitive counter for measuring samples of extremely low specific activity and for very soft radiation from samples which cannot be obtained as a suitable gas. It consists of a Geiger-Mueller counter surrounded by a wire screen and mounted in a metal cylinder. A positive collecting voltage is maintained between the screen and the outer shell to minimize absorption by the screen itself.

FLOW METER—ALPHA

A proportional counter for measuring the intensity of alpha particles in the presence of strong beta activity. It is specifically designed for checking radioactive samples and has a methane flow proportional counter and sample holder attached to the front of the scaler cabinet. Scales of 8, 64, 128, or 256 may be selected.

FLOW METER—ALPHA, BETA, GAMMA

An instrument for counting alpha, beta, and gamma radiations from samples utilizing a hydrocarbon gas-flow counter and sample holder. The pulse produced by the counter is proportional to the amount of ionization caused by the particles. Rapid counts can be made because large samples may be used and there is no window to absorb low energy beta radiations. Five counting-rate ranges vary from 200 to 20,000 counts per minute.

FLOW METER—ALPHA, BETA, GAMMA —DISCRIMINATING

A laboratory instrument which will differentiate between the alpha, beta, and gamma radiations of samples. Equipment includes a binary scaler and "Q" gas flow counter with sample holder. The addition of a timer permits predetermined time or predetermined count operations. A versatile instrument for research work involving either hard or soft radiations.

GEIGER TUBE—BETA—GLASS WINDOW

A Geiger tube for response to beta radiations. The window in the side of the tube is of thin glass, about .0005 inches thick. Available in both self-quenching and externally-quenching types.

GEIGER TUBE—BETA—THIN WALL

A Geiger tube with thin walls for response to beta radiations. Counter contains a self-quenching gas. With this tube set-ups can be made for measuring intensity of radioisotope samples.

GEIGER TUBE—BETA—MICA END WINDOW

A highly sensitive external-sample counter for beta particles radiated by such isotopes as C^{14} and S^{35}. The end window is a very thin sheet of mica to permit the passage of low energy radioactivity. These self-quenching tubes are valuable for tracer work where small samples must be measured. Mica end windows of various thicknesses down to about 1.5 milligrams per square centimeter.

GEIGER TUBE—BETA, GAMMA—GLASS WALL

A self-quenching glass wall counter for response to beta and gamma radiation. The cathode material may be silver or copper and the filling gas may be amyl acetate or ethyl ether.

GEIGER TUBE—BETA, GAMMA, X—METAL

A thin-wall aluminum shell forms the cathode of this Geiger tube. The self-quenching counter is sensitive to the more penetrating beta radiations and also to gamma, x, and cosmic radiations from any angle. Rugged metal construction withstands relatively rough handling.

GEIGER TUBE—BETA, GAMMA, X—MICA END WINDOW

A Geiger tube with a thin mica end window, and may include removable beryllium and copper absorbers. When both absorbers are removed, beta, soft x-rays, and gamma may be measured. With the beryllium absorber over the mica window, the beta rays are cut out. With the copper absorber in place, gamma rays alone can be measured.

GEIGER TUBE—GAMMA—GLASS WALL

A glass-wall Geiger tube for the counting of gamma radiations. The tubes are self-quenching, and may have a cathode of either silver or copper. Responds to radioactivity from any direction.

GEIGER TUBE—GAMMA—METAL

Geiger counting tubes for measuring gamma and cosmic radiations. The tubes have either all-metal shells or metal walls. Available in various sizes for response from all directions.

GEIGER TUBE—SLOW NEUTRON

A Geiger counter containing boron trifluoride for the detection of slow neutrons. The standard size has a 2-inch diameter, 14-inch length, with either 12 or 40 centimeter pressure.

SCALER—AUTOMATIC

A laboratory instrument which automatically records the pulse-counts from a Geiger tube. The length of time for which the counts are to be recorded is controlled manually by the operator. Some scalers integrate the counts as a power of 2 (binary scales of 2, 4, 8, 16, 32, etc. may be selected), others as a power of 10 (decade scales of 10, 100, 1,000, etc.).

SCALER—AUTOMATIC—PREDETERMINED

An automatic scaler for counting the number of impulses from a Geiger tube, but with the addition of timing devices which measure the length of time for a predetermined number of counts, or measure the number of counts for a predetermined time. When the specified time or number of impulses has been completed, the scaler shuts off automatically. Some instruments are designed for binary scaling (integrating the impulses by powers of 2), others for decade scaling (by powers of 10).

SCALER—X-RAY—PORTABLE

A compact instrument for measuring roentgens per minute. The separate ionization chamber is charged by an electrometer and may be placed in any position for the measurement of x-ray intensity. The x-ray equipment is turned on for one minute and a reading is made by inserting the chamber tube in the electrometer. Chamber tubes are made in various roentgen capacities: .25 r for small amounts of stray radiation; 25 r, 100 r, and 250 r tubes for superficial or deep therapy.

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SHIELDING AND HANDLING DEVICES

Two important methods of protecting personnel against hazardous radiations are by shielding the radioactive material and by permitting personnel to keep a safe distance away from the radiation source. The equipment listed here is either for shielding or for handling materials remotely or automatically.

BRICKS—LEAD—INTERLOCKING

Lead bricks are used in shielding personnel and equipment against radiation hazards. The interlocking type of brick are designed in a variety of angular forms to eliminate the joint space between the flat surfaces of rectangular bricks. Complete dense walls, corners, and similar constructions can be made.

BRICKS—LEAD—RECTANGULAR

Rectangular-shaped lead bricks for building up shielding walls against radiation, especially for penetrating rays such as gamma. Such walls may be used to protect personnel from exposure or to shield laboratory instruments from stray radiations.

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BUILDING MATERIAL—LEAD

Building materials suitable for controlling X-rays and radium rays in hospitals, laboratories, and industrial plants. Sheet lead is used to cover one side of partition blocks, laths, panels, doors, louvres, etc. Overlapping designs and the use of lead nails eliminates any possibility of leakage by injurious rays. Various thicknesses of lead are used to meet individual conditions of radiation intensity.

CONTAINERS—LEAD

Various types of lead containers for storing, carrying, and shipping radioactive materials. The lead linings may be from $\frac{1}{2}$ to 2 inches thick for various degrees of radiation intensity.

PIPETTE—REMOTE CONTROL

This remote control handling tool is suitable for measuring and transferring high activity liquids from behind a lead shield or with the operator a safe distance away from an unshielded operation. The framework of the device is of stainless steel and bronze. Copper and rubber tubes connect the pipette to a hand-operated pump. Pump has a capacity of 50 cc and filling accuracy can be maintained to at least the nearest 0.1 cc.

SAMPLE CHANGER—AUTOMATIC

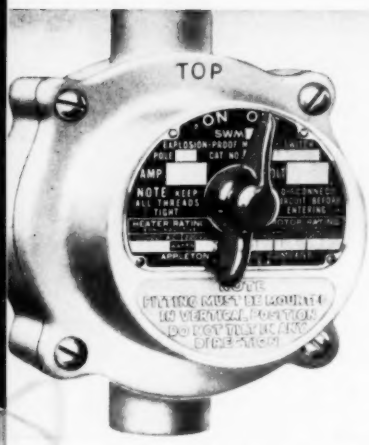
A group of instruments for the rapid and automatic measuring of radioactive samples. The sample changer will handle up to 25 samples without supervision. Samples are placed in slots on a circular disk. Each sample is, by turn, automatically pushed from the disk into a counting chamber where a Geiger tube responds to the sample's radioactivity. The Geiger count is relayed to a scaler which has been set for a predetermined number of counts. The time required for the scaler count is automatically recorded on paper tape.

SHIELD—LEAD—GEIGER TUBE

Various types of lead shields designed principally for use with specific types of Geiger tubes. The purpose of the shields is to reduce the background count of stray radiations in order that more accurate interpretations of radioactive samples may be made. One of the most common types is for shielding the mica end-window Geiger tube.

TONGS—HANDLING—REMOTE CONTROL

Distance from radiation source is an important factor in protecting personnel from over-exposure to radiations. These remote control handling tongs are of stainless steel and are about 2 feet long. Two sets of interchangeable rubber-covered jaws may permit the handling of laboratory equipment up to $5\frac{1}{2}$ inches in diameter. The jaws are actuated by a lever at the handle end of the tongs. "Hot" samples can be kept 3 feet away from the body by means of these tongs.



A mercury-tube type of switch for use in hazardous locations. Arcs are instantly smothered by inert gases. Contacts unaffected by dusts or gases.

Explosion-Proof Fittings

(From page 16) their own interests, but also for the purpose of effecting a substantial saving in insurance rates through the use of the safest known methods of wiring. Not only are explosion-proof fittings being used on new work, but also on old wiring systems which are gradually being rewired according to code requirements, so as to minimize the possible dangers that might result from the use of ordinary wiring fittings in hazardous locations.

In the wiring of hazardous locations, the problems of eliminating the switch spark, abnormal heat temperatures and faulty connections have been thoroughly studied by the manufacturers of electrical equipment. They have learned that it is impossible to restrain the highly flammable gases from entering the interior of either the explosion resisting or ordinary wiring systems, because in due time explosive gases will eventually enter into the entire line through the various joints and through the breathing of the conduit system caused by temperature changes. Furthermore, gaseous vapors will, without doubt, fill every crevice on any occasion of cover removal. Hence, the idea of rendering a switch unit entirely arc-proof is highly improbable, as the regulation of abnormal heat temperatures is equally as difficult, and as it is quite impossible to maintain an atmosphere free from flammable gases within the interior of the fitting. Therefore, it is logical to assume that in order to protect that section of the industrial plant classed as a hazardous location, the only solution remains in the positive confinement of the arc, heat and explosion within the internal limits of the explosion-proof fitting. These fittings are so constructed as to completely imprison the dangerous arcing, intense heat and subsequent explosion without allowing the gas-laden atmosphere on the outside to become ignited.

The explosion-proof fittings and fixtures shown on these pages serve to illustrate the most desirable type of engineering and construction. They are made of durable cast material and of a balanced design. Interiors are roomy with ample space for wiring and splices. The durable construction is fully capable of withstanding the high internal pressure which results from an explosion without bursting the fitting or loosening screws or joints. Finally, they are tested on the basis of a high safety factor as prescribed by the Underwriters' Laboratories in order to provide a comfortable margin of protection and to dispel all possibilities of disaster.

Pictures by courtesy of the Appleton Electric Company.

Worth the Risk?

A NEW safety training film, "Worth The Risk," made by the Crown Film Unit, sets out very directly—even brutally—to disprove the theory that accidents only happen "to the other fellow." The 16 mm. sound movie shows accidents happening to people who thought they were immune and could run risks with impunity. Sale or rental prints may be obtained by writing to British Information Services, 30 Rockefeller Plaza, New York 20, N. Y.

Management Changes at Pittsburgh Plate Glass Co.

JAMES GREEN, one of the nation's top glass manufacturing executives, retired on November 1 after 47 years service at Pittsburgh Plate Glass Company's large plate and automative safety glass producing plant at Creighton, Pennsylvania.

Mr. Green has served as superintendent of Pittsburgh's Works No. 1 at Creighton since 1940. He joined the firm at Creighton in 1902 as a "booker" and three years later was appointed assistant superintendent, a position he held for 35 years.

During Mr. Green's long service at Creighton, the Allegheny Valley plant was completely rebuilt. In 1924, tank melting of the glass batch and continuous grinding and polishing of plate glass were introduced at the Creighton plant. The conversion from the age-old method of melting glass batch in pot furnaces and finishing the product on "round tables" marked the beginning of a new era in the glass industry.

"Mr. Green's contributions to the development and perfection of the continuous system of producing plate glass has been outstanding. It is a record of attainment of which both he and the company can be proud," according to David G. Hill, superintendent of plate glass factories for the firm.

New Appointments

Thomas K. Gregorius, first assistant superintendent at Creighton since 1922, will succeed Mr. Green as plant superintendent. A native of Corning, New York, Mr. Gregorius is a graduate of Ohio State University with a B.S. in Engineering degree.

Other management changes include the appointment of Paul C. Lawson as first assistant superintendent in charge of Duplate safety glass manufacture and R. M. Hainesfurther as first assistant superintendent in charge of plate glass manufacture.

Hospital Fire Inspections

PREPARATIONS are virtually completed for the nationwide fire safety inspection of more than 6000 hospitals by trained engineers from the fire and casualty insurance businesses, announced earlier this year by the National Board of Fire Underwriters.

Several months of preparatory work have been spent in assembling the task force of nearly 1700 engineers who will make the surveys, in preparing an instruction sheet and a detailed inspection form, as well as working out details of cooperation with other organizations.

During the next few weeks, 22 instructional meetings will be held in various parts of the country to instruct the engineers on the methods to be followed in making the inspections. The Board of Fire Underwriters of the Pacific will sponsor such meetings in Phoenix, Ariz., Boise, Idaho, Butte, Mont., Portland, Ore., Seattle, Wash., and Salt Lake City.

The New York Fire Insurance Rating Organization will sponsor meetings at Albany, Buffalo, New York City, Rochester, and Syracuse. Other meetings are scheduled by the Fire Insurance Rating Organization of New Jersey at Trenton, the Fire Underwriters Inspection Bureau at Minneapolis, the Fire Insurance Rating Bureau at Milwaukee, the Kentucky Inspection Bureau in Louisville, the Louisiana Rating and Fire Prevention Bureau at New Orleans, the Missouri Inspection Bureau at Jefferson City, the Nebraska Inspection Bureau at Omaha, the New England Fire Insurance Rating Organization at Boston, the Oklahoma Inspection Bureau at Oklahoma City, the Tennessee Inspection Bureau at Nashville, and the Insurance Rating Bureau of D. C. at Washington.

It is expected the inspections will get under way soon after these meetings are held.

The inspections are being made on a public service basis without regard to the commercial aspects of insurance. Purpose of the inspections is to prevent loss of life in hospital fire tragedies. The inspections are being undertaken in cooperation with the American Hospital Association, the American College of Surgeons, the American Medical Association, the Association of Casualty and Surety Companies, the National Fire Protection Association, the National Association of Insurance Agents, the International Association of Fire Chiefs, and the various inspection boards and bureaus of the fire insurance business.

The hospital surveys will include data on each hospital's construction, boiler and power plants, chimneys and incinerators, electricity, exits, gas equipment, refrigeration, ventilating and air conditioning, kitchens, laundry, sewing room, repair shops, laboratories, pharmacy, X-ray equipment, operating room, storage and handling of compressed gases and flammable liquids, house-

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keeping, sprinkler system, fire extinguishers, fire alarms and watch service, drills and training, and public fire protection.

The scope of the inspections is deemed to include any institution, public or private, that involves the confinement of human beings through physical incapacities. This may be found to include many institutions other than those commonly referred to as hospitals. Hospitals of penal institutions are included.

A Special Committee on Hospital Inspection, appointed by the National Board of Fire Underwriters, is directing the program. Its chairman is Colonel Perrin C. Cothran of Hartford, Conn., Chairman of the National Board's standing Committee on Adjustments.

Fire Control of Liquids

(Continued from page 20)

spontaneous combustion in oil soaked rags and other shop waste materials. These fires occur through negligence, carelessness, poor housekeeping, and the lack of necessary equipment for the disposal of such materials.

There are many excellent makes and models of oily waste cans on the market for the safe disposal of combustible wastes. The nominal cost of a good oily waste can is much cheaper than even a small fire.

The fire protection features offered in oily waste cans are the self-closing, snug-fitting automatic covers that choke off the air necessary to support combustion and effectively smother the fire. See Figure 8. In addition, provisions are made to ventilate the base of the can to reduce the chances of temperature build-up within the can. Most cans are built with firm, durable foundations to prevent them from tipping over and spilling the contents on the floor.

Fig. 8. Oily waste can has automatic cover.

Drum protection should not be overlooked in this discussion of safe-saving fire controls. The use of the automatic faucet and screen combination will protect the operation of drawing off flammable liquids from a drum. The perforated metal fire baffle not only protects against interior ignition but acts as a strainer preventing foreign material from damaging the valve seat of the faucet. The faucet automatically shuts off when the hand is released from the valve lever.

Every year in this country over 20,000 reported fires (it is not definitely known how many more thousands are never recorded) occur through the mishandling of flammable liquids. This loss can be substantially reduced by careful attention to the use of proper methods and equipment which not only lessen the hazard of fire but also effect worthwhile savings in material and labor.

Pictures by courtesy of the Protectosaf Company.

Nuclear Safety Course

NEW YORK UNIVERSITY in cooperation with the Atomic Energy Commission will hold for the first time next January a three-day conference on Industrial and Safety Problems of Nuclear Technology.

Scheduled to be conducted January 10th, 11th and 12th at New York University, the conference will be the first of its kind in the area of industrial applications of nuclear technology. It will be sponsored by the University's adult branch, the Division of General Education and the University's Center for Safety Education. The conference was planned by Assistant Professor Sidney G. Roth, director of technical courses at the Division and Dr. Walter Cutter of the Safety Center.

The conference, according to Professor Roth, will attempt to meet the needs of industrial firms as well as technicians who want to know more about how atomic energy can be applied to peacetime uses.

"We expect," he said, "to give special attention to the complex problems of safety and public health raised by nuclear technology when used in industry."

The first day's discussion will be concerned with problems created by the production of radio-active materials with special emphasis on hazards associated with radiation. The use of isotopes and the requirements of a radio-chemical laboratory for safe handling of isotopes will be considered on the second day.

The third and final day of the conference will be devoted to questions of public health—water pollution, sewage disposal, etc.—which migh arise from the establishment of radio-chemical laboratories and Atomic Energy Commission installations. Important questions of insurance will also be discussed by leading investigators in the field.

Commenting on the unprecedented conference, the dean of the Division of General Education, Paul A. McGhee, declared: "It is with particular pleasure that New York University is taking the lead

New Products for Dec.

Flame-Seal Paint
Barricade Tape
Exit Signs
Huntelene Floor Treatment
Fluorescent Tube Disposal
Nylon Safety Strap
Safety Spinner
Fyr-Cry Alarm
Extinguisher Decals

See pages 70–71

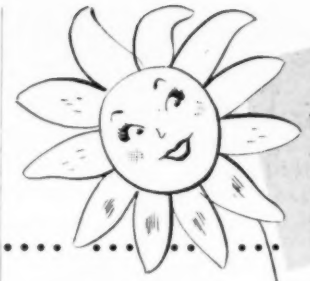
in this vital field of instruction. We are happy to have the cooperation of the Atomic Energy Commission."

Among the speakers who will participate in the the three-day conference are Gordon Dean, one of the five commissioners of the Atomic Energy Commission: W. E. Kelley, manager of the New York Operations Office of the A.E.C.: Dr. G. K. Green, chief of the Accelerator Project at the A.E.C.'s Brookhaven National Laboratory: Dr. Serge A. Korff, professor of physics at New York University: and Dr. G. Failla, professor of radiology at Columbia University.

Also Dr. Myron A. Coler, consulting engineer, who is an adjunct professor at New York University: Dr. Warren E. Winsche, head of the Chemical Engineering Division at Brookhaven: Dr. Paul C. Aebersold, chief of the Isotopes Division at A.E.C.'s Oak Ridge National Laboratory: Charles Rosenblum of the Research and Development Department of Merck & Co. (manufacturer of pharmaceutical products): and Thomas Lanahan of the Blickman Co. (manufacturer of stainless steel equipment).

Others who will speak at the seminar are Dr. V. Lawrence Parsegian, director of physical research for the Kellex Corp.: S. E. Eaton, director of research for Arthur D. Little & Co. (manufacturer of radiochemical measuring instruments): Dr. Bernard S. Wolf, medical adviser to the A.E.C.'s New York Operations Office: and Dr. Abel Wolman, consulting engineer, who is professor of sanitary engineering at the Johns Hopkins University.

Also listed among the scheduled speakers are Dr. George C. Manov, chief of the Advisory Field Service Branch of the Isotopes Division at Oak Ridge; Dr. Nathan H. Woodruff, assistant chief of the Isotopes Division, Oak Ridge; Dr. F. C. Henriques, technical director at Tracer Laboratories; and Dr. Charles Williams of the Liberty Mutual Insurance Company.



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For the best in eye protection get H. S. Cover's Gas-Tight, Fog-Proof Goggles.. $1.65 pp.

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Ansul President F. J. Hood Dies

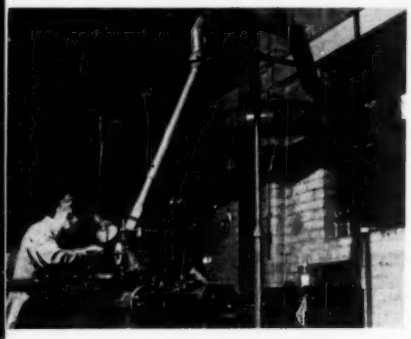
FRANCIS JAMES HOOD, president of Ansul Chemical Company, died suddenly at the age of 44 on November 10 while on a business trip in New York City.

Hood was elected to the presideney of his company less than a year and a half ago. Before that, he had served as vice-president, secretary-treasurer and originally, California representative.

The Ansul executive was a past president of the Refrigeration Manufacturers Association. Two years ago he served as chairman of the All-Industry Air Conditioning and Refrigeration Show in Cleveland. He was also a member of the Compressed Gas Association and represented his company in the Fire Extinguisher Manufacturers Association.

Ansul's chief products are liquid sulfur dioxide, methyl chloride and dry chemical fire extinguishers. The main office of the company is in Marinette, Wisconsin.

Preventing Accidents in Britain



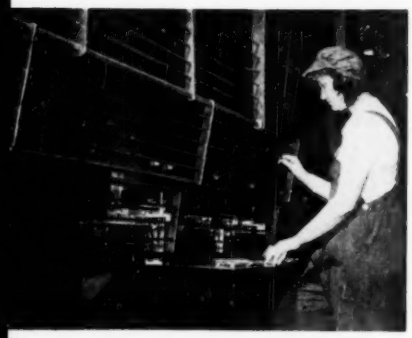
A machine with a dust extractor fitted to it. Where machines create abrasive dust during operation, dust exhausters prevent the dust from harming the health of the worker. This is one of the many practical measures taken in Britain to look after the welfare of workers in industry.

(Continued from page 17) it has not been easy to arrive at a general tabulation of the safeguards to be taken. There has recently been compiled a list of all those parts of industrial machinery of every kind which are dangerous, and which, "will cause accidents if not securely fenced or if not of such construction as to be as safe as they could be if securely fenced."

The list, which includes every part of machinery used in all industries likely to prove dangerous, ranges from revolving shafts, spindles, mandrels, and bars to projecting belt fasteners and reciprocating tools and dies. In all there are 25 distinct groups of parts listed.

One or more of these 25 groups of dangerous parts will be found on every machine used in industry of any kind, no matter what processes are used. By referring to the list, any factory manager will know at once what parts of every machine in his plant must be guarded to prevent accidents. Any of the five recognized methods of guarding or a combination of them can be applied to any machine. The five methods are:

1. a fixed guard, or
2. an automatic guard, or
3. an interlock guard, or
4. a trip guard, or
5. a positional safety guard.



Woman worker in one of Britain's factories operating a heavy press which has front and side safety guards. She wears a safety cap to prevent her hair becoming entangled in the machinery.

Accidents Due to Women's Hair

Other safeguards to be taken call for a good deal of patience and correct psychology in dealing with personnel. A major cause of serious accidents is the catching-up of clothing or hair in machinery. During World War II there was at one time an alarmingly high rate of scalping accidents among female munition workers. Many women were new to factory life, and did not like to conceal attractive hair in caps and nets. Some accidents happened in consequence usually on unfenced or on inadequately fenced machinery.

Accidents of this kind do still occur in Britain's factories, but they are infrequent because the machinery that caused these accidents is better fenced. Men are reluctant to take precautions sometimes: welders often remove eye-shields because of the discomfort of wearing them and pay a heavy price in consequence. But manufacturers of this type of protective device now are supplying more comfortable goggles, and wearers are less inclined to take them off.

Some of the most important advances in accident prevention have taken place in Britain's textile industry. Agreements have been worked out with cotton-weaving and spinning companies, laying down minimum safety-requirements for spacing of machinery and guarding. An important clause deals with the possibility of expansion, because in the past firms sometimes installed more looms to increase output in existing space, with the result that cramped working conditions increased the risk of accidents. Today, in erecting a new shed, "in order to allow for possible future developments involving the installation of deeper looms, the depth allowed for two looms and alleys should be not less than 10 feet 9 inches."

More Space for Machinery

Weaving mills now are in some instances removing idle looms to create more space for safe and easy movement. Back alleys and spaces between looms and wall have been widened. This is done largely to reduce the risk of rupture and strain inherent in carrying beams on the shoulder around pillars and in narrow footways. In seeing that the new recommendations on spacing are carried out, the Inspector of Factories has the backing of a tough enforcement rule. When he directs that certain steps must be taken to minimize the risk of accident or strain in beam-carrying, the mill owner may claim that the required steps are unreasonable. In that case an independent Committee, representing the employer, operatives, and the Factory Inspector will carry out an examination of the mill. The Committee must then communicate its decision at once both to the employer and the District Factory Inspector.

Another interesting development concerns the reducing of the effect of dust-polluted atmosphere in spinning-mills. Various medical authorities have established after long research that certain lung complaints are definitely traceable to cotton-dust. The germ is prevalent due to the condition in which United States growers send the raw material to Britain. Spinning companies are spending hundreds—in some cases thousands—of pounds on installing special dust-extraction ma-

chinery and oil-spraying equipment to reduce this danger.

These safety practices governing cotton-mill operation in Britain today have been arrived at after a long process of improvement on voluntary agreements.

Pictures by courtesy of British Information Services.

Handling Chemicals

(From page 13) working plants, and no employees should be permitted to take meals on or near them.

Next, if the substance is handled as little as possible, and, as in the manufacturing process, kept enclosed away from human beings as much as possible, the accident and health rates will be very low.

Process Control

Lest the statement be made that enclosing a few gallons of a solvent of an especially hazardous nature is different from the matter of enclosing tons of the material, it should be pointed out that the enclosing process might be different but the fact of enclosing will be the important factor. In spray painting, the enclosure takes the form of automatic spray painting, without the presence of a workman during the operation but with a fully ventilated booth, recovery of overspray, and eliminations of static and fire hazards.

Even so-called personal protection can be operated as a part of the enclosure process. Dipping by hand in carbon tetrachloride can be so accomplished with solvent-impervious gloves and a ventilated hood that no part of the operator comes in contact with the chemical. Even though only a few pounds of chemical are used each day, this is in every respect an enclosed process.

Particularly with solvents, the question of explosibility and flammability must be considered and, of course, the first rule is that danger areas should never permit matches, open lights or any medium which might cause fire, explosion or toxic manifestations. All the problems of hazardous chemicals require this approach even though a fire may not be the danger guarded against. Thus, in degreasing operations, it is well known that the chlorinated solvents will form phosgene in the open flame, and this substance has a much higher toxicity rating than the original chlorinated solvent.

Construction Details

Buildings and plant should be located with due regard to the dangers which might arise from the processes involved. For example, they should be spaced at distances which are considered safe for the fire, explosive and toxic risks connected with the processes in adjacent buildings.

In some cases, buildings may be satisfactorily divided up by the use of fireproof screen walls. All combustible building materials, particularly wood, unless suitably treated to make it fire-resisting,

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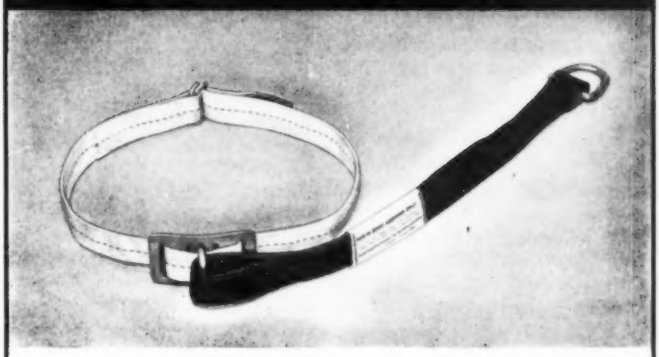

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should be excluded.

All workrooms must contain a sufficient number of doors and windows, and must have suitable and adequate means of escape for workpeople in the event of fire or explosion.

Lightning protection apparatus should be fitted, where required.

The plant, sewers, drains and flues should be so designed and constructed as to reduce to a minimum the escape and spread of any liquid, gas, vapor, fume or dust likely to give rise to poisoning, fire or explosion, both during the normal working period and in the event of an accident or emergency.

Electrical Equipment

No electric non-enclosed arc lamp, or naked light, fixed or portable, should be used in, on or about any part of an operation where there is a possibility of fire, explosion or poisoning from flammable gas, vapor or dust. All incandescent electric lights in such parts must be in flameproof enclosures, and all switch and fuse boxes for electric lights should be outside the building or danger zone. The wiring inside the building should be as short as possible, and should be covered in such a way as to make it safe, having due regard to dangers from corrosion.

No internal combustion engine, electric motor, or other electrical equipment capable of generating sparks (e.g., motor starters, electric bells) should be installed in the building or danger zone, unless of a flameproof type.

Precautions should be taken against the dangers from static electricity which may arise from a great variety of causes. All machinery and equipment on which static electricity is likely to accumulate, in particular, pipe lines, should be effectively grounded, and receivers for flammable liquids should have metallic connections to the grounded supply tanks so as to prevent static sparking. Humidity control may also be desirable.

Stoves must not be used for the artificial heating of places in which there is danger of ignition of gas, vapor or dust. Steam, hot water or other safe non-flame methods of heating are permissible.

Safe methods of providing heat for the process should be employed, and where the use of open flame is necessary, the construction of the operations should be such as to prevent any escape of flammable gas, vapor or dust coming into contact with the flame or exhaust gases or other hot agency likely to cause ignition. All vapors or dust of an explosive or flammable nature should be removed expeditiously, preferably at or near to the point of liberation, by means of safe and efficient exhaust systems.

Decatur Casting Co. Shows Its Record

THE Decatur Casting Company of Decatur, Indiana, featured its safety record in a display by the company in its exhibit at the Industrial Section of the Annual Decatur Street Fair held from October 10 to 15, 1949. At that time, the company had a safety record of 457 days without a lost time accident, a record which went back more than a year to August 2, 1948.

The company's exhibit consisted of the Safety Record Board, displays of photographs of the inside of the plant, and pictures of the Decatur Casting Company Open House held a few years ago.

Safety has always received prime consideration by the management and employees. Various safety awards have been received by the company from the National Safety Council and insurance organizations in every year beginning in 1943.

Storing and Handling

Storage places should be segregated and constructed or fire-resisting materials and special attention given to preventing accidents from leakage or the mixing of chemicals. Buildings above ground used for the purpose should be at an adequate distance, having regard to the slope of the ground, from other buildings, and should be well ventilated.

Buildings in which flammable liquids are used should not be connected with the normal drainage system.

Empty containers which have held flammable liquids should be effectively closed or filled with water, if possible, and stored where they will be safe from unauthorized interference. Too much care cannot be taken to insure that the containers are thoroughly cleaned out before they are sent for repair or breaking down. Similar attention should be given to containers, such as those that have held sulphuric acid, in which flammable gases may be generated by interaction between the metal of the containers and the contents.

All pipe lines for the transport of flammable or toxic liquids should be protected from breakage, and should be arranged so that there is no risk of mechanical damage due to the movements of trucks, vehicles, etc., and should be so laid that they drain throughout, so that deposits cannot collect in any part. They should also be protected against the effects of frost.

Where possible, catch basins should be placed under parts of plant where there is a serious risk of leakage. Adequate drainage should be provided and this should lead to special treatment tanks so that the deleterious material may

be neutralized and rendered harmless before it is discharged into the ordinary drains or sewers.

Deposits both inside and outside reaction plant, melting pots, dissolving vessels, centrifugals, filters, pipe lines, cocks, drains, etc. should be removed at the earliest possible opportunity. Care must be taken to prevent the occurrence of fire or explosion due to the too forcible removal of deposits (e.g., in pipe lines or other places) by metal tools, or heated metal wire, or by external heating other than by means of steam or hot water. Efforts should be made to remove deposits with hot water, steam, or other suitable solvent, but if this is inadequate, careful rubbing and scraping should be employed using tools made of non-sparking metals or alloys.

Care should be taken to prevent the occurrence of fire or explosion due to the faulty condition of raw materials, or the inadvertent use of wrong materials caused by such things as inadequate care in the labelling and issue of stocks.

Labelling and Warning

By means of suitable notices, attention should be drawn to the poisonous nature of the substances used or made, and warning should be given of the danger of tasting materials or of using for drinking purposes any vessel used in connection with chemicals.

A suitable system for the identification of pipe lines containing different materials should be used to prevent the opening or manipulation of incorrect lines. Whether quantities be large as in a chemical plant, or small and diverse as in a general manufacturing plant, chemicals should be dispensed from a central source so that proper control of the substances may be set up. This central control will reduce to a minimum the distribution of unlabelled or incorrectly labelled chemicals.

The labelling of chemicals and solvents is done very carefully by the manufacturer, who not only considers labelling from his own standpoint, but assigns personnel to work with the Manufacturing Chemists' Association on the development of labels and safety precautions.

The manufacturer must label his products so that they meet the requirements of all State and Federal laws.

The Manufacturers' Chemists' Association has issued manuals in regard to the handling of different kinds of containers filled with different kinds of hazardous chemicals. This supplements statutory requirements and includes this special labelling for particular products designed primarily for the protection of the consumer and include special labels to warn transportation employees of the hazard. In addition, there have been agreements between the Surgeon General of the Public Health Service and Chemical Producers on methyl alcohol, carbon tetrachloride and other volatile chlorinated *(To page 56)*

Fire Hydrant Problems

PEOPLE who open fire hydrants pose one of the worst problems for the men who furnish water to Chicago, Fred G. Gordon, assistant city engineer, told attendants at the National Conference on Industrial Hydraulics recently in the Sherman hotel, New York City.

"Operating hydraulics embraces a number of phenomena not referred to in the textbooks," Gordon told the hydraulics experts in describing the water supply system of Chicago. He cited the hot weather diversion of opening fire hydrants as an example.

"Force, cajolery, and artifice have been employed," he said. "The help of the police and fire departments have been enlisted, placards have been placed on hydrants, and special hydrant caps have been installed in some of the worst locations." The special caps require a socket wrench.

"Need I tell you that some of the hydrant openers are just as ingenious as the Department's engineers?" Gordon asked. "They have been able to either remove or break the cap or secure a wrench of satisfactory contour or dimensions."

The engineers cited complaints of low water pressure caused by the illegal opening of hydrants, using statistics from one hot August day as an example. Maintenance of adequate pressures over the entire water supply system is a major concern of the city, he said.

Describing Chicago's water supply system, Gordon said that seven steam operated and five electric stations are connected through three major tunnel systems and one minor tunnel to five cribs located from two to four miles offshore in Lake Michigan. Flow from the lake to the suction wells at the pumping stations is by gravity.

Running the water works involves a Design Division, a Construction Division, an Operating Division, a Water Purification Division, a Water Pipe Extension Division, and a Pumping Station Efficieney Station.

Some of the jobs done by these divisions, according to Gordon, are stoppage of underground street leakage, promotion of water conservation, control of load distribution between stations, and tests for fire flow.

"Some leakage takes place from plumbing fixtures within private premises," he said. "It may be in an apartment where the tenant does not pay the water bill, or it may be in premises where no meter is installed."

A house to house inspection of plumbing fixtures began in 1942, Gordon said, and a marked reduction of leakage has resulted. Statistics indicate that one of every ten fixtures examined, leaked.

The two-day conference was sponsored by Armour Research Foundation of Illinois Institute of Technology and the Graduate School of Illinois Tech.

In safety circles everywhere Flex-a-Foam Filter Masks are making news, because here for the first time is a respirator that workers really welcome and wear—without the usual prodding from supervision. Look at these unusual features:

1. **It's light and easy to wear—weighs only 1 ounce, fits any size face with comfortable snugness.**
2. **It's *easier* to breathe and talk through than an ordinary linen handkerchief.**
3. **Its exclusive method of headband adjustment keeps mask snug and comfortable—without tension or hair pulling.**
4. **It's so smartly styled that workers don't look or feel peculiar, and are no longer the brunt of jokes.**
5. **It's low in cost, low in upkeep—easy to clean and keep clean.**

FLEX-a-FOAM'S filter is a honeycomb of whipped foam latex that *keeps out non-toxic nuisance dusts as small as 1/25000 of an inch.* Positive-locking molded plastic frames are so flexible they adjust themselves to every wearer's facial contours, yet so tough they're unbreakable in normal usage.

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Quesnel to Head Safety Executives

EDGAR G. QUESNEL, director of safety for the Borden Company, has been elected president of the Safety Executives Club of New York. The club is devoted exclusively to the study and discussion of safety policy and trends. Membership is limited to executives who formulate safety policy for their firms.

A graduate of Washington University in St. Louis, Mo., Mr. Quesnel has made a number of important contributions to safety in his long career. He became actively interested in safety work after World War I, while serving as superintendent of an oil refinery in Madison, Ill. In 1921 he became safety engineer for the Commonwealth Steel Co., in Granite City, Ill.

Mr. Quesnel then entered government service, first as safety engineer for the St. Louis area, and later as safety director for the State of Kentucky. He rose to the position of assistant to the director of safety, in charge of 13 Midwestern states. In the fall of 1937, he joined the Borden Company.

Last year, he was appointed by the government to represent the United States at a special conference on accident prevention in Geneva, Switzerland. The conference, sponsored by the International Labor Organization and attended by representatives from 25 countries, was held in October. Mr. Quesnel summarized the latest American accident-prevention techniques. The purpose of the conference was to develop better worldwide understanding of accident causes and prevention and greater international cooperation in safety.

Mr. Quesnel has discharged numerous important duties for both national and local safety councils, the International Association of Milk Dealers and the National Council of Private Motor Truck Owners. During World War II, he was regional director for the U. S. Department of Labor, supervising safety for war industries in six Eastern states. For his outstanding work, he received a citation of merit from the Secretary of Labor.

Gro-Cord Increases Its Service

GRO-CORD'S new tractor trailer makes possible a new service to shoe manufacturers. Gro-Cord Rubber Company of Lima, Ohio feels that this innovation will be of decided advantage to their customers for several reasons: faster delivery when needed, lower handling costs, and no chance of shipments going astray. The new tractor trailer can be loaded with 15,000 pairs of heels and soles, and be on its way, directly to the shoe manufacturer, within a very short time after an order has been received. The merchandise will arrive on the manufacturer's dock without having been transferred from one vehicle to another while in transit. Thus all shipping cartons will be in A-1 condition upon arrival at their destination. The new International Truck and 28' aluminum Fruehauf Trailer are completely equipped with modern safety devices. It is anticipated that this added service will become so popular, in the not too distant future, that another truck and two trailers will have to be added.

Make Safety Meetings Count

(From page 11) the activity is of slight importance and encourage hasty presentation that interferes with comprehension. Meetings that are too long may attempt to cover too many phases of the problem, dull interest and reduce the amount of information retained.

Subject

The subject to be covered has a direct relation to the length of the meeting. In any case, however, the subject should be one that can be stated in not more than a dozen words. This brief statement provides the hooks on which the ideas presented may hang. This brief statement furnishes the compartments into which the various ideas presented may be put. This brief statement supplies the key that will cause this stored information to be recalled either for immediate personal application or to be passed on to subordinate workers. One of the tests of the effectiveness of any meeting is the ability of the majority of those who attend to identify certain specific ideas that they have obtained from it. Another important purpose of the safety meeting is to arouse and stimulate interest in accident prevention. In the long run, this attitude is best founded on definite, usable facts. The central subject will arouse interest and cause the members to leave the meeting with this interest satisfied if it relates to individual purposes and satisfactions. These will vary with the nature of the group involved.

Group

Composition of the group should be given careful consideration in order that individual purposes and satisfactions may be largely of the same character. Machine operators are primarily concerned with personal expenditure of energy in relation to work produced as this, in turn, relates to compensation. Accident prevention, to them, has meaning in terms of personal hurt, impairment of earning capacity, loss of wages, extra expenses. It is distinctly a personal affair.

Supervisors may not be directly involved in an accident. Injury of a worker means that they have to train a substitute. They have to shift production schedules. They have to make out reports. They have to explain to management the losses and inconvenience resulting. An accident means disruption of their plan of production. It will definitely increase their work. The positive side of prevention has a bearing on the smoothness of operation and the cost of operation.

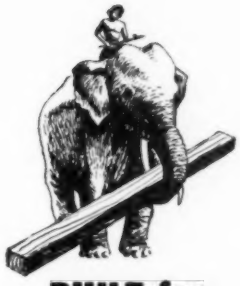
Executives are not concerned primarily with the details of safe practices. There interest is largely on costs and profits. Accidents and hazardous conditions increase the cost of production. Increased costs affect selling price and competitive status. These have a two-way bearing on profits.

With all groups, there is an humanitarian side. Workers do not look upon other workers as merely cogs in a production line, but as friends. Foremen and supervisors have personal interest in those they direct. Executives generally do not regard employees merely as so many figures on a ledger sheet. These elements, however, are most forceful when inferred rather than directly emphasized.

Subject Development

"Subject Development" has been separated from "Subject" in order to emphasize that it must grow out of the specific interest of those who are to attend the meeting. Every subject may be developed in a number of ways. In selecting the specific steps through which the plant's accident prevention problems and plans for their solutions are to be presented, the safety director or chairman of the meeting must continually keep the nature of the group in mind.

Suppose the subject is "Eye Injuries." If those attending the



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meeting are *workers*, the outline for the agenda might be as follows:

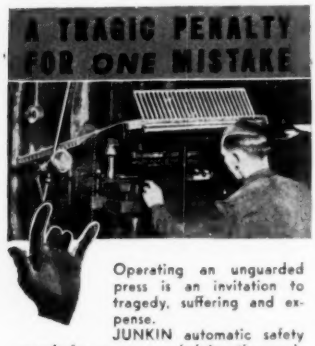
1. The value of good eyesight
   A. Accuracy of work
   B. Less fatigue (ease of work)
   C. Amount of production (accomplishment)
2. Value of two eyes
   A. Depth perception—accuracy in guiding tools
   B. Field of vision—able to notice things coming from the side
3. Impairment of eyesight or loss of eye means restricted job opportunities, less income
4. How eyes can be injured
5. Difficulty of recovery from injury
6. How eyes can be protected
7. Agreement to use protective devices.

Suppose the same subject is to be presented to *supervisors*. The outline might then be in this form:

1. Analysis of eye injuries in the plant
2. Analysis of eye hazards
3. Effect of eye injuries and hazards on production costs
4. Provision for eye protection
5. How to get workers to use these provisions
6. Disciplinary rules for workers who refuse to conform.

Finally, if the meeting is to be for *executives*, the outline might be developed as follows:

1. Cost of eye injuries
2. Plant hazards and their relation to production effort
3. Provision for protective devices with statement of their cost
4. Methods being developed to insure that workers use protective devices



Operating an unguarded press is an invitation to tragedy, suffering and expense.

JUNKIN automatic safety guards for presses are helping thousands of enthusiastic users set new safety records . . . higher production schedules. JUNKIN guards operate automatically from foot pedal, fall by gravity to bolster plate. Press can't operate until guard is in position.

Write for this New Bulletin

JUNKIN SAFETY APPLIANCE Co., Inc.
930 W. Hill Street
Louisville, Kentucky

JUNKIN SAFETY GUARD

Preparation

In too many cases, preparation for a meeting is limited to the chairman alone. Every member should be prepared, even those who will not be called upon for action. For special meetings there is generally some preparation. The purpose of the meeting is announced, and so those who come anticipate certain information. Regular meetings, however, frequently do not have this valuable aid. This preparation should not attempt to cover everything that will be done. An analysis of radio listening habits indicates that many people enjoy suspense.

You have selected "Eye Protection" as the subject for your next monthly meeting. If this subject is announced as stated, some will think about it before they attend. Give it a little twist. Use for your subject, "The Eyes Have It," or "What's An Eye Worth To You?" or "Are Two Eyes Better Than One?" Many more will begin to wonder just what will be covered. There may be some discussion as to the meaning of the phrase. These subjects would be appropriate for a meeting of line workers. For a foremen's meeting, "Eliminating Eye Injuries," or "More Help With Your Eye Protection Problem," would be more appropriate. For executives, "Eye Costs Can Be Reduced," or "Eye Protection Produces Profit," would arouse interest. Preliminary thought on any of these subjects prompts member participation.

Preliminary thought also increases the amount of valuable information the individual will take away from the meeting. His attention will be keener. If, in the presentation, he recognizes things that he has already thought about, he will get satisfaction out of this recognition. His interest will be increased if the familiar ideas are found in a little different environment. The principle of education that we learn by linking new material to the things we already know has the best possible chance of working under these conditions.

Follow-Up

Safety meetings, to be of greatest value, should always result in specific action. Members begin to forget some of the things that have been presented as soon as the meeting is over. Therefore, the safety chairman or director should have a device to remind them later of the

NO MORE ATHLETE'S FOOT!

The simple Ōnox method of skin-toughening will quickly rid your plant of all Athlete's Foot complaints.
Thousands of leading industrial plants now use Ōnox, in preference to disinfectants.
There is no splash, no mess, no waste. The men *like* Ōnox, and the cost is only 1c per man per week.

TRIAL OFFER

Prove Ōnox to your own satisfaction in a 60-day Proof-or-no-Pay test. Simply write:

ŌNOX, INC. DEPT. E-3, 121-2nd St., San Francisco
WAREHOUSES: BROOKLYN, CLEVELAND, NEW ORLEANS, LOS ANGELES

essential points covered. The detail of this reminder, the specific method to be used and the timing will depend upon all of the factors which went into the planning of the meeting itself, i.e., how frequently are these meetings held, the characteristics of those who attend, and the nature of the subject discussed. Since in most meetings, the members make some contribution, this habit of participation can be encouraged by proper reference to these items in the follow-up.

Keep the Tools Sharp

The plant safety program as a whole and any of the means used to develop it should be periodically examined to determine its value in relation to quality and cost of production and improvement of employee relations. A good safety meeting can help supervisors to do a better job. A good safety meeting can make an accident prevention program more effective. You are probably moving toward good safety meetings when the majority present are glad they attended, when the majority who attend are looking forward to the next one. This is a start, but it is only a start. To it must be added these tests: Do the members leave the meeting with a definite conviction that safe practices will help them in their individual work? Do they leave the meeting with at least one specific safety idea that they can put into use?

Regard a safety meeting as a tool. Treat it as you would any other tool of production and profitable results will be secured.

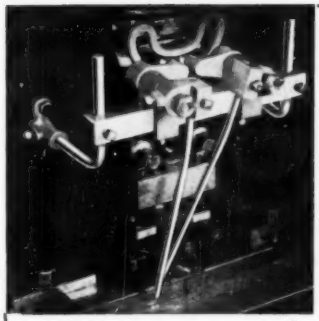
Fire Losses in U. S. Decreased

MONTHLY fire losses in the United States fell to a new low point for the year in October, totaling an estimated $48,914,000, which represents a decline of 1.5 percent below the loss total for September, according to W. E. Mallalieu, general manager of the National Board of Fire Underwriters.

This was a reversal of the usual seasonal trend in fire losses, since the monthly totals usually rise during Fall and Winter months. It is interesting to note that Fire Prevention Week was widely observed in thousands of American communities during October. October's fire loss also represented a decrease of 5.7 percent below the total for the same month last year. Estimated losses for the first ten months of 1949 were $547,141,000, which is a decline of 7 percent below the total for the same ten months of 1948.

Losses for the 12 months ending October 31, 1949, are estimated at $669,487,000. This is a decrease of 5.5 percent from losses of $708,475,000 for the 12 months ending October 31, 1948.

These reported losses under fire insurance policies include an allowance for uninsured and unreported losses.



HI-SPEED POWER PRESS GUARDS

HI-SPEED becomes part of . . . operates with . . . the press. WHEN THE PRESS REPEATS— THE GUARD REPEATS

HI-SPEED is dependable . . . Slightest movement of the press gate sets guard in action. Swiftly, smoothly, safely, both hands are whisked from the danger zone long before the "pinch point" is reached. The guard operates from the danger zone out, in both directions. Both hands are safe, not just one. You can't tie it down. An air leak or short circuit cannot affect this guard.

HI-SPEED is sturdy . . . Shock and vibration proof. All bearings and moving parts are made of or cushioned by durable bronze. Nickel steel crank pins and hardened steel rollers and roller pins.

HI-SPEED is economical . . . Simple design of the guard assures a low initial cost, and longer life on the job. Fewer parts to wear, fewer replacements, less maintenance. Simple to install and quickly adjusted to meet varying tool changes.

HI-SPEED is accepted . . . By management, operators, safety engineers, insurance companies, state and local labor departments. HI-SPEED is being adopted as standard equipment by world-famous manufacturers.

HI-SPEED is fully guaranteed against mechanical defects for one year. And, customer satisfaction is guaranteed.

Send for complete information on HI-SPEED today!

SAFETY ENGINEERING COMPANY
DERBY, CONNECTICUT

Safety Programs Do Pay Off

NINE years ago the Southwest Ice & Dairy Products Company of Oklahoma turned to safety. Since July 1, 1940 that organization and its allied companies, the Southwest Service Company, and the Central Dairy Products Company, have won 8 first awards, 1 second and 2 third awards in the National Safety Contest. Many of the driver salesmen have received awards from the Council and 95% of the plant employees have received awards each year.

Sloan Childers, safety engineer for the company, asserts that there are still too many accidents, but that with the assistance of the engineers of their insurance carriers, the splendid cooperation of the supervisors, plant managers and officials, "we have come a long way in our safety effort in the past nine years."

THE Future SHOWS

Cleveland. Ohio

First Plant Maintenance Show and Conference, Jan. 16–19. (Auditorium). Clapp & Poliak, Inc., exposition management, 341 Madison Ave., New York 17, N. Y.

Industrial
BURN CASES
Slow and Non-Healing WOUNDS
Usually respond quickly to
DIONOL
OINTMENTS
Dionol Ointments melt at body temperature for almost immediate effectiveness.

Write for samples
DIONOL PHARMACAL COMPANY
Kalamazoo 11, Michigan

Miami Beach, Fla.

National Society for the Prevention of Blindness Conference, March 26–30. (Floridian Hotel). National Society for the Prevention of Blindness, 1790 Broadway, New York 19, N. Y.

New York, N.Y.

Twentieth Annual Safety Convention & Exposition, March 28–31. (Hotel Statler). Paul F. Stricker, Executive Vice-President, Greater New York Safety Council, 60 E. 42nd St., New York 17, N. Y.

Columbus, Ohio

Twentieth All Ohio Safety Congress and Exhibit, April 11–13. (Neil House) James H. Fluker, congress chairman; G. S. Kallenbaugh, congress manager, 65 S. Front St., Columbus 15, Ohio.

St. Louis, Mo.

Central States Safety Conference, April 18–20. (Hotel Jefferson). Reyburn Hoffman, Secretary-Manager, Safety Council of Greater St. Louis, 511 Locust St., St. Louis, Mo.

Chicago, Ill

Thirty-fifth Annual Convention of American Association of Industrial Physicians and Surgeons, April 23–29. (Hotel Sherman). Dr. Edward C. Holmblad, 28 E. Jackson Blvd., Chicago 4, Ill.

Toronto, Ont.

Annual Convention International Accident Prevention Associations, April 24–25. (Royal York Hotel). R. B. Morley, General Manager, International Accident Prevention Associations, Toronto 2, Ont.

Chicago, Ill.

Twenty-seventh Annual Midwest Safety Show, May 2–4. (Hotel Sherman). Joseph F. Stech, Manager, Greater Chicago Safety Council, 10 N. Clark St., Chicago 2, Ill.

Pittsburgh, Pa.

Twenty-fifth Annual Western Pennsylvania Safety Engineering Conference, May 2–4. (William Penn Hotel). H. H. Brainerd, Executive Manager, Western Pennsylvania Safety Council, Chamber of Commerce Bldg., Pittsburgh 19, Pa.

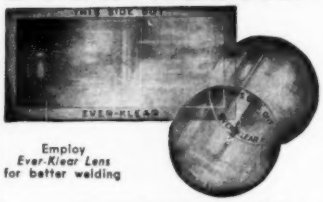
Charlotte, N.C.

Twentieth Annual North Carolina Statewide Industrial Safety Conference, May 3–5. (Hotel Charlotte). H. S. Baucom, Safety Director, North Carolina Industrial Commission, Raleigh, N. C.

Boise, Idaho

Western Safety Conference, June 18–20. L. M. McKay, Vice-President, Western Safety Conference, P.O. Box 1038, Boise, Idaho.

EVER-KLEAR COVER LENS
NINETEEN YEARS OF PROVEN SERVICE



Employ *Ever-Klear Lens* for better welding

Clear Vision
Comfortable Vision
Is what EVER-KLEAR Cover Lens gives you.
You can't do your best welding unless your vision is clear and comfortable. Thousands have found this to be true after using EVER-KLEAR Cover Lens. They give a keen sharp view of the weld always. They do not pit.

Size 2x4½" for arc-welding shields ..... $ 2.40 per dozen
Sizes 46/2 to 50 M.M., for goggles ..... .35 per pair
Contact your nearest Jobber. If they cannot supply you, send order direct, giving Jobber's name.

F. R. FAULK, DISTRIBUTOR
405 PENN AVENUE ROOM 803 PITTSBURGH 22, PA.

PROGRAM FOR FIRST PLANT MAINTENANCE SHOW

MANY subjects of vital interest to personnel and safety directors will be on the program for discussion at the first Plant Maintenance Show, to be held in the Auditorium, Cleveland, Jan. 16–19.

The four-day exposition, which

will be held concurrently with a four-day conference, is the first ever devoted exclusively to maintenance. The program will be sponsored jointly by the American Society of Mechanical Engineers and the Society for the Advancement of Management. The Cleveland Engineering Society will be hosts at a dinner for visitors. L. C. Morrow, editor, Factory Management and Maintenance, will be general chairman of the conference.

Topics scheduled for discussion include: "Maintenance Organization and Management"; "Budgeting the Maintenance Operation"; "Selection and Upkeep of Lighting Equipment"; "Upkeep of Motors, Controls and Distribution Equipment"; "Using Electrical Instruments in Maintenance"; "Upkeep of Floors, Walls and Roofs"; "Protection, Decoration and Cleaning of Surfaces"; "Sanitation and Housekeeping"; "Lubrication"; "Application of Service Equipment"; "Protecting the Plant," and "Protecting the Worker."

More than 100 exhibitors will give demonstrations of machinery, materials and methods for reduction of costs in plant maintenance.

Advance registration cards, which will provide admission to both the exhibits and the conference, are obtainable without charge from Clapp and Poliak, Inc., 341 Madison Ave., New York 17. Hotel reservations may be made by writing Plant Maintenance Show Housing Bureau, Terminal Tower, Cleveland, O.

New Hose for Mines

A NEW water hose, primarily for use in coal mines for wetting down dangerous dust is announced by the B. F. Goodrich Company, Akron, Ohio. To make the hose easily seen in mines, it is being made with an orange color which is easily visible in the dark. The hose is available only in 3/4 inch size with 1 3/16 inch outside diameter.

field tests show

18 TIMES THE WEAR

SURETY'S NEW SURESEAL PK GLOVES (with GRIPTITE PK FINISH)

In tough, on-the-job tests, Sureseal PK Gloves with Griptite Finish wore 18 times as long, handled 18 times as many parts, as good hot mill gloves with ¼-inch thick wrappings of friction tape. And that kind of wear means LOW glove costs.

Sureseal PK Coating is super-resistant to chemicals . . . won't crack or peel. Surety's exclusive Griptite Finish grips effectively, wet or dry, oily or not—won't scratch metal, lasts as long as the gloves. Band top or knit wrist types available, with or without ventilated back.

Write for sample (on your business letterhead, please, specifying job involved).

THE SURETY RUBBER CO. CARROLLTON, OHIO

Safety Celluloid

(From page 21) story of three men who lost their eyesight through carelessness. George, Bill, and Steve "forgot" to wear their safety glasses. It only took a few seconds for the metal particles to hit their eyes. For the rest of their lives, they will live in darkness because of their own carelessness.

This was the message the foremen wanted to have reach their employees. This was the incentive that made the group plan a program that "hit home" with the employees.

Effective Education

The employees, in groups of 20 to 30, were called in during working hours. An introductory speech was made by Mr. Smith explaining why the film was being shown. The film succeeded in making the employees realize they, personally, had to assume responsibility for the safety of their eyes. With the impact of this realization, a campaign was put into effect immediately. The employees were fitted for safety glasses and goggles. Stations for cleaning glasses were set up throughout the plant.

The results—eye injuries seven months after the film was shown were reduced 75%, compared to eye injuries during the seven months preceding the film. The Company has succeeded in convincing their employees they need to safeguard their eyesight!

"The reduction of industrial eye accidents at the Ithaca Gun Company has been accomplished largely by the use of visual aids. These methods can be used by other industries with desirable results," stated Professor Jehring.

Picture by courtesy of the N. Y. State School of Industrial and Labor Relations.

What Is New in the Safety Field?

See pages 70–71

LEARNING THE

SPRAY BOOTH

A RECENT fire was caused by the spontaneous heating of paint residue which had been cleaned from a sprinklered spray booth but not removed from the building. Early in the evening a watchman found fire which spread into the exhaust stack before the public fire department could extinguish it with a large hose stream. The booth, stack and spray painting equipment were destroyed and windows and a small section of roofing were damaged. Investigation after the fire disclosed that the valve controlling the automatic sprinkler in the booth had been closed by some unauthorized person.

Paint residue should be removed from plant areas promptly after the close of cleaning operations. Control valves for spray booth sprinklers should be listed on the weekly inspection blank and checked during all inspections.

PRESS REPEATS

TRAUMATIC amputation of both hands was the result when a punch press operator got her hands in the way when the press repeated. It should be unnecessary to repeat that such presses can be guarded to eliminate this type of accident.

VAPORS IGNITE

EMPLOYEE was unloading tank of gasoline from a delivery truck into the underground storage tank at a service station. After he had made his connections and started unloading the gasoline, he left the truck and entered the service-station office to secure cash and charge tickets. He was away from the truck only a short while when the vapors escaping from the fill line ignited, possibly from a match.

The employee rushed to the tank and closed one valve, and accidentally disconnected hose, spilling gasoline on himself. He was burned and the truck was damaged.

HIDDEN HAZARD

ANOTHER shipyard worker received a painful broken toe when a metal casting fell on his foot. This man was dragging a coil of copper tubing out of a waist-high bin when, unknown to him, a loop of the tubing snagged the casting and dragged it from an adjacent bin.

A visit to the yard's safety shoe store would of course have eliminated the injury, but how about the accident itself? Being stored at a waist-high level, it would have been a simple matter to inspect the equipment before removing it from storage. Also, it is considered desirable to lift items from storage shelves instead of dragging them out. Either of these two precautions would have eliminated the hazard and this man would not now be hobbling around with a broken toe.

HEAVY LOAD

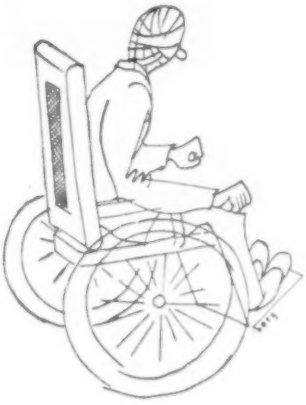
HELPING to repair a leaking water line, an employee picked up the stabbing end of a 22-foot joint of 4-inch pipe. Two other men picked up the opposite end of the pipe with carrying tongs. As pipe was carried into position, employee handling the stabbing end was in an awkward position. He was supporting the entire weight of one end and walking through mud 6-inches deep. While carrying the pipe, he felt a sharp pain in the lower portion of his back. When he stabbed the pipe and straightened up, the pain became intense. Upon examination, it was found that back muscular ligaments had been strained.

Use one man per inch of diameter when picking up and carrying line pipe. Under such conditions as those present in this instance, use a fifth man to stab the pipe. The hazards of haste should be emphasized to foremen and safety meetings.

CHECK UNIT CAREFULLY

THE cracked stabilizer had been shut down during extremely cold weather and apparently some water which froze in one of the reflux drain connections was not detected by the operator checking. After the unit was started the water thawed, allowing a substantial volume of gas to escape. When the employee attempted to close off the line, the gas flashed, causing severe burns resulting, after about sixty days, in the employee's death.

To prevent a similar accident, a more careful check of the equipment prior to heating should be made.



CAUGHT IN FAN BELT

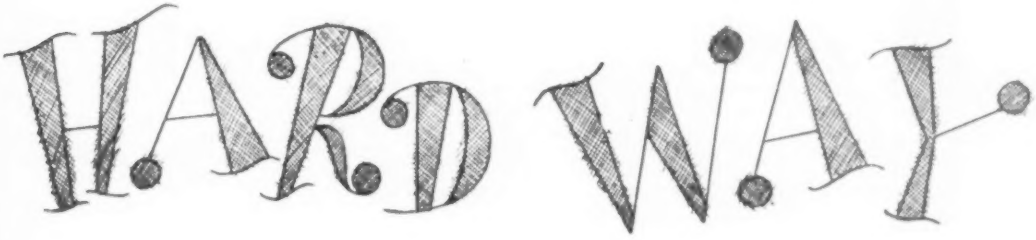
A MECHANIC was attempting to free a frozen water pump by pulling on the fan belt. The water pump came free and the mechanic's fingers were caught between the belt and the pump pulley. The result was a broken finger.

AWKWARD WORKING POSITION

EMPLOYEE was engaged in tightening the metal straps used to secure a box car load. The top strap had been tightened, and the strapping tool closed for further adjustment while the lower strap was tightened.

In order to tighten the lower strap, the employee had to kneel on the floor, and while pulling on handle of the strapping tool his hands slipped and his head bumped against the upper strapping tool.

When an employee is forced to assume an awkward position on a job, more than ordinary precautions should be taken to see that injury does not result from tool failure or an unexpected stress or strain.



SAFETY ENGINEERING Salutes a Safety Idea for December

A REPLICA of a midget auto race is used as a safety campaign aid in three departments of Plant 4 of The B. F. Goodrich Company, Akron, Ohio. The departments are calendering, extruding and sheeted tire repair and patching materials. The cars advance on the board only if the departments are accident-free. The board also shows the number of days each department has gone without a lost-time accident. The display was created by Earl Harrah, safety engineer of Plant 4, and Charles LaSala, foreman in one of the departments.

Handling Chemicals

(From page 47)

liquid hydrocarbons, carbon bisulphides, aniline oil, industrial benzol and chlorinated naphthalenes, chlorinated diphenyls and chlorinated diphenyl oxides.

Of the M.C.A. manuals on the handling of containers filled with various hazardous chemicals, there is one dealing entirely with Warning Labels. This guide is divided into two parts:

1. A guide for the preparation of Warning Labels for Hazardous Chemicals.

2. Illustrative Warning Labels for Hazardous Chemicals.

It should be noted that the definition of a "poison" as placed on the label includes only chemicals capable of causing acute effects by ingestion and inhalation. This definition *excludes* chemicals capable of causing injuries as a result of skin absorption or of chronic exposure by ingestion or inhalation. This is in itself a limitation on the value of labels as it eliminates the poison part of the label from materials such as trichlorethylene which industrial hygienists recognize as quite toxic.

However, a very sincere and serious effort is made to cover the most toxic materials without diluting the quality of warning.

Without entering into this phase of labelling exhaustively, it might be said that it is the most successful part of the program. Continuing efforts are being made to bring more and more substances, particularly those having cumulative and chronic toxic effects.

Handling Small Quantities

With all the other precautions, we still need a close control over the dispensing of small amounts of chemicals. In industry, the control of distribution by a central store setup will not only largely eliminate the unauthorized use of chemicals but will provide a good cost control on the various usages.

It has been noticed that even this type of control has failed in some instances where the employee was not convinced of the hazard. Thus, it is quite common for fire extinguishers using carbon tetrachloride to be "bled," for industrial use in washing parts, etc. This is not only unsafe from the toxic solvent standpoint, but is hazardous in that proper fire protection is difficult to maintain. The only remedy seems to be education. The coloring of the extinguisher fluid and warning of its unsuitability for other purposes doesn't always work.

A very important factor is well-trained personnel in the store salvage and standards divisions. A common failure in the labelling program has been the use of empty containers for other bulk chemicals.

STOP Oily Floor Mishaps with FULLER'S EARTH
TAMMS
Avoid costly accidents caused by slipping on oily or greasy floors! Reduce fire hazards! Replace sawdust or wood shavings with Fuller's Earth. Every shop and industrial plant where machinery is present needs this low-priced safety aid.
Fuller's Earth *absorbs* oil and grease — and it's non-inflammable.
Write for FREE SAMPLE or trial order at quantity price.
Dept. R.M. 10, TAMMS INDUSTRIES, Inc., 228 N. LaSalle Street, Chicago 1
FORMERLY TAMMS SILICA COMPANY

Oftentimes, the labels are not removed and serious accidents have resulted. When empty containers are salvaged, all marks and labels should be removed at the time the container is being cleaned. As mentioned previously, safety precautions should be observed in the cleaning of containers, steam being used in preference to other means for most containers and no welding or cutting should be done without the cleaning operation.

While the labelling program has resulted in much good, the problem of removing these labels once the original purpose is served remains the largest single barrier to a completely successful program, just as more complete labels are being placed on more of the toxic and hazardous chemicals, so the above difficulties can be solved by educational campaigns. The compulsory removal of labels does not seem to be a very workable method.

In closing, it should again be emphasized that the general principles apply to all hazardous chemicals. Specific information on any one substance, solvent, or compound should be obtained from original sources and that information referred to the general precautions.

From an address presented at the 18th Annual Greater New York Safety Convention.

WANTED SAFETY PRODUCTS

National, promotion minded Sales Agency, calling on Industrial Safety Jobbers, will accept one or two additional lines with high reputation and strong potential.

MARKET INNOVATORS, Inc.
1775 Broadway
(General Motors Building)
New York 19, N. Y.

Award for Perfect Safety Record

AT A formal presentation ceremony, recently, the Sharp & Dohme West Point, Pa. plant received an award plaque of the National Safety Council in recognition of the perfect safety record achieved by the plant employees during the year ending June 30, 1949.

The ceremony was held in the plant cafeteria before the entire personnel at the plant and marked the third consecutive year in which Sharp & Dohme has won national safety honors. Henry W. Gadsden, Vice President, accepted the award on behalf of the employees from Fred L. Barrows, representing the National Safety Council.

The perfect record of no lost-time accidents, involving 315,089 man-hours of work, won the plaque for the plant in the Group B, Division 1 Chemical Safety Contest sponsored by the National Safety Council. This record is still intact and since June 30 the total man-hours have climbed to more than 400,000.

Army Safety Campaign

AN EXTENSIVE safety drive is under way by the Galveston District of the Corps of Engineers to promote safe operation among contractors working for the Army Engineers. The Galveston District, of which Lt. Colonel Ellsworth I. Davis is District Engineer, extends over two-thirds of the State of Texas and is engaged in the construction of flood control, navigation and military projects.

According to Lt. Col. Davis, approximately 800,000 man hours monthly go into the construction of these projects. The Galveston District, which is under the Southwestern Division of the Corps of Engineers comprising four Engineer districts, has been leading the division since January 1947.

"Safest" among all Galveston District activities was the operation of the dredge "Miama," owned by the Standard Dredging Company and engaged in dredging of waterways along the Texas Gulf Coast. Working for the district since September 1948, and accumulating 274,134 man hours, it has been operated without a lost-time injury, Col. Davis reports.

NEXT BEST THING
TO YOUR EYES IS...
eyegard
IT'S A Super Feature...
EyeGard "Champions" have 10-way ventilation!
In coverspecs or regular models. For chippers and grinders as well as welders.
If you want the "best" in eye-protection without paying a premium for it—then you want EyeGard "Champions". There's extra comfort in them because the superlight plastic is molded to form-fit the face . . . extra protection because the goggles are impact-resisting . . . extra ventilation through three large vents at side of cup and seven additional vents around the lenses. Cool and fog-free. With all these superior features they cost you no more than ordinary goggles. Next time you order—get EyeGard "Champions"!
Write for free catalog of Eyegard Equipment . . . it will save you money!
AMERICAN INDUSTRIAL SAFETY EQUIPMENT COMPANY
841 Lexington Avenue
Brooklyn, N. Y.
A DIVISION OF THE BURDETT OXYGEN COMPANY • CLEVELAND, OHIO

industrial Hygiene

ASSOCIATE EDITOR
JACOB A. GOLDBERG, A.M., Ph.D.

Air Pollution in Pennsylvania

PENNSYLVANIA has launched an intensive program to study the problem of polluted air. Dr. Norris W. Vaux, secretary of the Department of Health, announced plans for a statewide program to determine the effects of polluted air on the public health. This program will be undertaken by the Bureau of Industrial Hygiene under the direction of Dr. Joseph Shilen, bureau director.

A special division of the bureau has been established to concentrate on the problem. The principal means of attack in the campaign will be a unique mobile field laboratory now being built for the bureau at the Mine Safety Appliances Company, Pittsburgh.

This laboratory will be equipped with scientific instruments and devices to sample and analyze atmosphere suspected of containing harmful or annoying gases or dusts. It will be ready in about two months.

The new Air Pollution Division, with headquarters in Harrisburg, will be headed by J. S. Sharrah, presently stationed at the Industrial Hygiene Bureau's Pittsburgh laboratory. Because air pollution is relatively new in the science of public health, there are a limited number of experts in the field, Dr. Shilen said. Mr. Sharrah has done considerable research on air pollution.

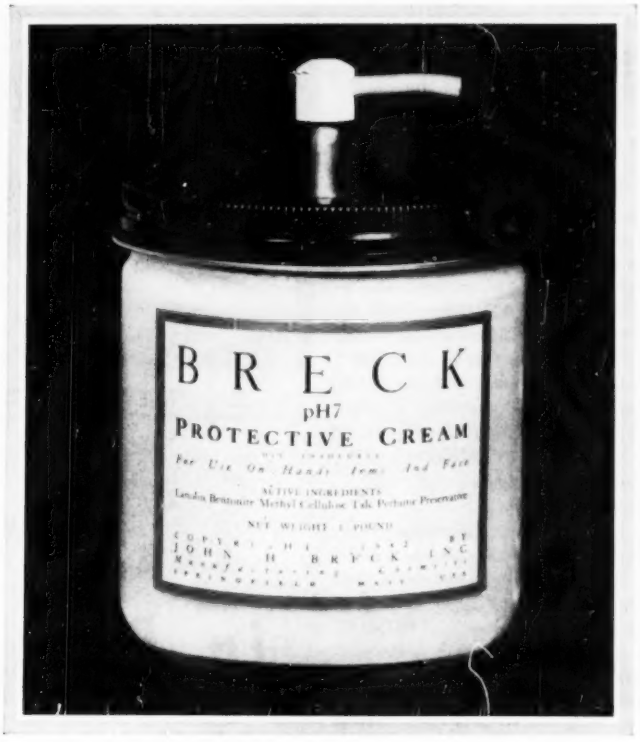
The new laboratory will be the only one of its kind in this country. Besides containing all the necessary equipment for taking air samples, the field laboratory will provide facilities for on-the-spot analytical studies of many industrial hazards. Further tests also will be made at the bureau's permanent laboratories in Harrisburg, Philadelphia, Pittsburgh, Scranton, Williamsport, Altoona and Erie. Air pollution surveys will be made by the "air detectives" with the mobile laboratory at the request of industrial plant managements, civic groups and municipal or county officials.

The mobile laboratory will have its own power-generating plant and heating system because many surveys and studies have to be made away from a power supply. In some instances, laboratory analysis must take place immediately after the air sample has been obtained since chemical changes might destroy the sample.

One of the important instruments in the field laboratory will be a electrostatic dust and fume sampler. With this device, precise quantitative samples of dusts, fumes and smoke can be taken from atmospheres in factories or industrial areas. Air-borne particles are deposited on the inner surface of a collecting cylinder where they are available for analysis by weight, count, chemical or radiological study. At the bureau's main laboratory in Harrisburg, a spectograph will be employed to identify samples of air-borne dusts by type and location.

Another instrument in the field laboratory will be an indicator to determine concentrations of hydrogen sulphide in the air. One of the most toxic of the more common industrial gases, hydrogen sulphide is harmful in extremely low concentrations. Other instruments include special detectors for sulphur dioxide, carbon monoxide, nitrogen dioxide and benzol. There also will be devices for checking the explosibility and flammability of gases and vapors. One unique device, called an osmoscope, will be employed to detect and identify odors.

Because weather conditions are important factors in air pollution, a complete set of meteorological instruments will be used by the field laboratory staff in the surveys. As the program progresses, Dr. Shilen said, other instruments will be installed in the field laboratory, including a Geiger counter to measure radioactivity. Additional field labs also may be acquired.



BRECK

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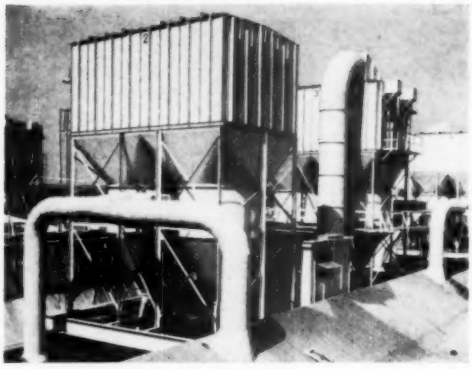
How to control liquid wastes in enameling
How to control airborne wastes inside the plant
How to control airborne wastes outside the plant



View of dust collectors showing bag room (at top), cyclones (center), and hoppers (bottom part). These collectors handle exhaust air at the rate of 35,000 cubic feet per minute, returning the filtered air to the plant.

Control in Porcelain

By HUBERT S. KLINE, Industrial Hygiene Engineer.

A FEW years ago a subject such as this one might have been taken somewhat lightly. But since the late war, and more especially since June 30, 1948, those manufacturers who have liquid wastes to be disposed of very definitely have a problem. Smoke ordinances exist in many large and small cities and the public enthusiasm against atmospheric contamination, both inside and outside of industrial establishments, is mounting rapidly. So today, only the inattentive or unwise members of management are failing to prepare their plants with the proper methods for controlling liquid and airborne wastes.

CONTROL OF LIQUID WASTES

Evaluation of the Problem

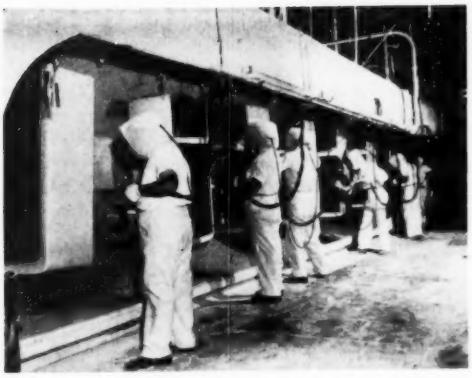
President Truman ignited a campaign effort that had long been smoldering among those ardent fishermen who would have our streams and lakes rid of any type of pollution. Public Law 845, signed June 30, 1948 was the keynote to action long awaited by State Health Departments and organized sportsman groups. In very recent months many states have assembled manufacturers, municipal officials, conservationists and the press and have effected agreement among these representatives towards control of industrial and domestic wastes. Notable among such efforts are the amendment of the Detroit City Ordinance wherein specific limitations are imposed upon industries seeking to discharge wastes into municipal sewers. The Ohio River Valley Water Sanitation Compact was signed by the Governors of eight states along this river on the same day that the President signed Public Law 845, known as the Water Pollution Control Act. These eight neighboring states are bound by agreement to pass necessary legislation to effect mutual aid toward riddance of pollution from this great water course. The die is cast and additional measures are well on the way.

Sewage Treatment Plants

Perhaps the most satisfactory method of disposal of trade wastes is to dump them into the local sewage treatment plant. This plan eliminates the costly operation of a waste disposal process and relieves management of responsibility for satisfactory compliance with state and local regulations on waste disposal. Before attempting to contact municipal authorities with such a proposal, arm yourself well with knowledge of sewage plant operation and some of the properties of your exhausted or dirty plant solutions. That cyanide tank in the pickle layout might look small when compared to the vast digestion tank on the sewage plant property, but so was David when compared to Goliath! Cyanide solutions can easily kill bacteria and destroy or impair sewage digestion. In fact, bacteria are just as temperamental in their living as are some humans. When our systems become acid, we become sick and cease normal function in our digestive tract. Gasification may result, and in fact, this does result when excess acid gets in a sewage digestion tank. The pH of good digesting sludge is between 7.1 and 7.4. Trouble results when the media falls much below pH 7.0. Gradual release of waste acids can be acceptable to sewage plant operation, but it is well to notify the sewage plant superintendent when large quantities of such wastes must be dumped. Metal salts of nickel and copper greatly interfere with the sewage system, and acids with pH below 4 or 5 should be neutralized to save sewers from damage and to lessen the blow upon the local sewage plant.

Discharge to Rivers or Lakes

Porcelain enameling wastes, consisting essentially of acids, alkalies, cyanides and metal salts, have three general effects upon stream life, namely, (1) cause



Enamel sprayers working in exhaust ventilated spray booth and wearing air-line helmets. Helmets provide clean, filtered air through fittings on cap to allow flow over face piece.

# of Wastes Enameling

Frigidaire Division, General Motors Corporation

death by direct toxic action (2) cause death by indirect action, such as oxygen depletion or destroy food supplies for fish and (3) drive fish from the region of waste discharge by creating an undesirable environment. Ellis (1), Richer (2), and others have made valuable contributions to the literature on the tolerances of fish to industrial poisons. Fish prefer a stream having a pH range between 6.5 and 8.4, cyanide content below 0.1 part per million, and free of sludge banks and deposits. A pH range below or above 5.0 and 9.0 is definitely undesirable. Consider the fact that many stream beds are slowly being blanketed by sludge deposits which prevent growth and bottom plants upon which fish thrive.

Another, and more important phase of this disposal procedure, is the effect of such wastes upon water used for water supply and recreation, such as bathing. Fortunately enameling works do not usually employ such chemicals as phenol, cresol and oils which create tastes and odor difficulties in processing water for consumption. However, acids cause corrosion of water treatment equipment and also damage river boats, steel piling, and the like. Cyanide is extremely undesirable in recreational waters.

Engineering Approach to Liquid Waste Control

What once was a lost wilderness as far as research goes is now a fertile field of information, ready for easy assimilation by plant engineers and designers. Just a few years ago, industrial groups were begging state and local sanitary engineering departments for recommendations on how to approach waste treatment problems, what standards were available, and how to chemically analyze waste solutions in dilute amounts. A well known sports leader once challenged a meeting of state and industrial representatives with the opinion that ways and means of solving industrial waste treatment problems could be effected once industry puts its mind to it. Organized research projects are buzzing along on many meaty problems, such as, treatment of pickle liquors, metal plating wastes, oil and petroleum residues, and hosts of others. Federal and State Agencies can now be of ready assistance to you.

Early in the plant investigation the manager or his process engineers should determine, (1) if solutions can be reclaimed or conserved to lessen the waste disposal problem, (2) if there is a nearby sewage plant into which the wastes can be discharged with little or no pretreatment, and (3) if other neighboring industries can pool their wastes in a common plant for mutual treatment on a share-the-cost basis. In many cases considerable time and money for preparing new solutions can be saved by filtering, settling suspended matter and using the solution an extra week or two before dumping. Neighboring plants may have such waste products as lime, limestone or carbide sludge which can be used for neutralizing pickle acid.

After taking a quick look at the problem, then more definite information is needed, such as: (1) complete inventory of waste solutions including quantities of each, (2) survey of utilities to determine sewer connections, sewer flows at various periods and sewer destinations, (3) flow of river or other receiving body in order to effect satisfactory dilution, (4) chemical nature of waste flow including pH, acidity or alkalinity, settleable solids, suspended solids, cyanide content, metal salts, etc., (5) consult health and municipal authorities to determine degree of treatment needed to protect stream life, public drinking water supply, sewer construction, or sewage plant operation, and, (5) possibility of concentrating wastes by segregation from rinse waters if treatment is necessary.

Methods for Treating Pickle Wastes

Pickle acids and cyanide neutralizing solutions are of general interest and are considered most detrimental to streams and sewage plants. A number of tested procedures are mentioned and additional details may be quickly obtained from trade literature. Two recognized programs are suggested: (1) controlled dilution, and (2) chemical treatment. The first involves careful calculation of discharge rates and dilution rates of

additional flowing clear waters such as the receiving stream or total sewer flow into the sewage plant. A complete knowledge of health department requirements is necessary in order to avoid overloading the receiving body. Holding tanks designed to receive wastes prior to admission to sewers, greatly facilitate removal from the plant and reduce losses in production time. These same reservoirs or additional sump tanks can serve to trap leakage from damaged tanks. Discharge from the holding tank can usually be extended to last several days, if desired.

Pickle acids can be neutralized by several methods, such as: (1) utilize alkaline cleaner solutions as far as possible, (2) addition of lime slurry to raise pH to about 6, (3) addition of pulverized 200 mesh limestone and aeration to settle iron salts, (4) discharge the acid waste onto beds of coarse limestone, and (5) controlled dilution by slow discharge to receiving stream where natural alkalinity of water can neutralize the acid. The first three procedures result in suspended solids which quite often are difficult to settle because of ferrous sulfate content. Step (4) is difficult on account of coatings on the crushed limestone. Procedure (5) requires time if waste is discharged direct to stream. In this case a holding tank is recommended. Cyanide solution can be treated in a number of ways, such as: (1) decomposition by chlorination, (2) by ion-exchange aeration methods, (3) addition of ferrous sulfate to form ferrocyanides, (4) treatment with lime-sulfur, (5) addition of acid in a well ventilated tank having forced draft through a tall stack, and (6) very slow discharge to sewer allowing for absorption, dilution and gradual decomposition of the waste. The first and second procedures are relatively new and appear to be worth considering. Steps (3) and (4) are used frequently and are satisfactory, especially the use of ferrous sulfate. Care is needed to insure that only neutral, acid free, salts are added. Process (5) is quite old and may cause atmosphere complaints in nearby communities or homes. The dilution technique (6) is workable only if adequate dilution water is available and is not recommended if first class streams or lakes receive the flow of waste.

We may conclude the first portion of the subject by stating again that a great wealth of material is now available to help plant representatives who must treat and/or control liquid waste discharges.

CONTROL OF AIRBORNE WASTES

Let us now turn our attention to the airborne waste problem of porcelain enameling plants. Until now, we have considered only liquid wastes which may be defined as solutions undesired and requiring discharge. On the other hand, airborne wastes may be losses of valuable materials, as well as obnoxious vapors and gases, which escape into the air inside of the plant or are transported outside of the plant by exhaust systems. The first classification on such losses, namely, those airborne inside of the plant, become the problem for the industrial hygiene engineer. When such airborne materials are transported from the plant through exhaust systems in large amounts they become a problem for the plant engineer, process department or the chemical laboratory. When do these airborne wastes become a problem? At this point we divide the subject matter for further consideration.

Inside the Plant

Porcelain enameling processes create airborne wastes which can be considered detrimental to the working environment inside of the plant. These wastes may be dusts, mists or vapors, and gases. Industrial Hygiene may be defined as the combined effort of engineering, chemistry, physics and medical sciences to maintain the working environment free of harmful substances capable of causing occupational diseases. As we have mentioned before, the average human can withstand the toxic effects of many known poisons for varying lengths of time without injury. Accordingly, many states and agencies of the Federal government have established limits of exposure for a large number of airborne substances found in most industries. These are recorded as maximum allowable concentrations (MAC) of chemicals permitted for safe inhalation or exposure during an eight hour working day. An average limit of MAC limits for the enameling industry would include those found in Table 1.

TABLE 1

Substance	Maximum Allowable Concentration ppm	mg/m³	mppcf
Benzene (benzol)	100		
Benzine (naphtha, Stoddard solvent)	1000		
Carbon monoxide	100		
Carbon tetrachloride	100		
Chlorine	1		
Chromic Acid		0.1	
Fluoride dusts, smokes		1.0	
Hydrochloric acid	10		
Hydrogen cyanide	20		
Hydrogen fluoride	3		
Nuisance dusts			50
Silica (quartz, free silica)			5
Sulfuric acid		5	

Note: ppm or parts per million parts of air.
mg/m³ or milligrams per cubic meter of air.
mppcf or millions of particles per cubic foot of air.

With a knowledge of these limits the Industrial Hygiene Engineer is in a position to evaluate the hazards of the working environment and to recommend a satisfactory solution. We should keep in mind that it is very often necessary to spend money to save money. Workers in some industries are being exposed needlessly to toxic atmospheres which, in due course of time, will render them unfit for further work. This may require payment of compensation in seemingly large amounts, but actually far less than the person's productive worth. State compensation groups, the legislatures and labor organizations are cognizant of these

facts and industry must show a proper attitude towards maintaining a healthy work place in the shop.

Dusts in Air

A common source of dust in the enameling process is the mixing of the enamel materials in the Mill Room. Handling of bags of frit, clay and other dry ingredients in preparing the additions for the enamel slip can create very high dust counts in the breathing zones of workers so employed. From information at hand, it is evident that enameling dusts do not contain high concentrations of free silica. Nevertheless, the plant manager and his staff cannot overlook the fact that there is a potential hazard that can result from inhaling small amounts of free silica over long periods of time. From Table 1 we find that silica-bearing dusts are limited to a definite number of particles per cubic foot of air allowed for inhalation in a scheduled 8 hour working day. To avoid compensation and legal claims resulting from questionable exposure to workmen, it is well for the management to consider installing exhaust ventilation equipment, or to provide approved respirators for Mill Room employees who handle dusty material.

Spraying of enameling slip can also be the cause of high dust exposure to the sprayer. This is particularly true when the operator is spraying into a cabinet or concave surface which allows for the material to bounce back into his breathing zone. For this reason, it is well to do all spraying work in exhaust ventilated spray booths. An ingenious air line helmet, providing 6 cubic feet of clean washed air per minute, was devised which the operator can wear at all times while spraying. This helmet protects him from inhaling any of the dusts resulting from spraying process.

Another source of dust in the porcelain enameling plant is the brushing of enamel from the edges or surfaces of ware coming from the drying ovens. It is common to see employees wearing cotton gloves wiping off the dried enamel dust and then clapping hands to remove the dust from the gloves. In many cases portable revolving brushes are used and in other instances hand brushes are used at elevations above the worker's head which allows dust to fall into his breathing zone. Here again it is recommended that well designed exhaust systems be installed or that approved respiratory equipment be provided.

Mist and Vapors

Cleaning of the ware prior to enameling can cause mist or vapor to be created in the plant atmosphere. For these reasons, all toxic materials and heated tanks of non-toxic material in the pickle layout should be exhaust ventilated. If there is any doubt regarding the need for exhaust ventilation, acid and alkali vapors when inhaled will dispel the doubt. These materials cause severe irritations of the membrane of the nose

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and throat and also irritate the eyes. Heated tanks of liquid which cause steaming are generally ventilated in order that humidity in the plant can be controlled at a satisfactory low level.

Gases

An occasional source of complaint is the gases from drying ovens in connection with pickling and firing of enamel ware. Gas fired ovens can be a source of carbon monoxide as well as irritating combustion products of the burned and unburned gas. Another source of complaint is from the gases arising from the furnaces. Fluoride bearing enamels can be the cause of irritating fluorine gases. This complaint is noticed usually by maintenance workers required to service conveyor lines running through the furnaces. Such gases are toxic in low concentration and cause severe irritation of the respiratory system and the eyes. For these reasons it is well to provide exhaust ventilation, or at least exhaust stacks, on furnaces and ovens.

AIRBORNE WASTES
Outside the Plant

Atmospheric contamination by trade wastes has passed the "matter of fact" stage and now is entering the "matter for concern" era. Mounting public opinion is beginning to crystallize and rain down upon managements whose plants are the worst offenders. For many years only those industries whose airborne wastes were toxic to persons and vegetation in neighboring communities have been required to take necessary control procedures. Today the finger is pointed toward all manufacturers and others who create neighborhood nuisances, either in the form of odors, dusts, mists, fogs, or smokes. We must evaluate our problems in this new light.

Prevention of Atmospheric Contamination

A logical approach to controlling atmospheric waste discharges would be a survey of all exhaust stacks on the roof. Each stack should be numbered, and data regarding the quantity and type of discharges tabulated. From these data separate lists may be prepared of harmless, doubtful and obnoxious discharges. Chemical and physical analyses will reveal additional information regarding the seriousness of the problem.

There are a number of qualified equipment manufacturers available to handle dust collecting problems for the scrubbing and removal of mists, vapor and gases from exhaust systems. For this reason, I will not take the time to discuss the means whereby these airborne wastes can be removed from exhaust stacks. However, attention should be directed towards the collection of dusts from the exhaust spraying booths, sand blast booths, brushing rooms, and from the Mill Room. Such dusts can be a neighborhood nuisance. Wash systems are recommended for removing acid, alkali and cyanide vapors from the pickle system since any of these materials can be harmful or undesired in the surrounding neighborhood atmosphere. Gases in the stacks from ovens and furnaces usually are dilute and do not require attention.

In summary then, airborne wastes are a subject of concern in many cases depending upon the particular plant problems, and should be evaluated by a competent person in order that the porcelain enameling plant can maintain an atmosphere both safe and free of annoying substances. Airborne wastes can be a detriment to the public relations efforts of any plant whose management is either unaware or uninterested in community welfare.

Special References:

(1) M. M. Ellis, Detection & Measurement of Stream Pollution, Bulletin No. 22, U. S. Dept. of Commerce, Bureau of Fisheries.

M. M. Ellis, Industrial Wastes & Fish Life, Proceedings of the First Industrial Waste Utilization Conference, Purdue University, 1944, Page 126.

(2) W. E. Ricker, Industrial & Domestic Waste in Relation to the Aquatic Life of Indiana Streams, Proceedings of the Second Industrial Waste Conference, Purdue University, 1946, Page 90.

From an address presented at the 10th Annual Forum of the Porcelain Enamel Institute. Pictures by courtesy of the Frigidaire Div., General Motors Corp.

New Division of Public Health Service

FEDERAL Security Administrator Oscar R. Ewing recently announced the creation of a new division in the Bureau of State Services, Public Health Service, to be known as the Division of Engineering Resources. At the same time, Mr. Ewing made public the appointment of M. Allen Pond, Assistant Chief Sanitary Engineer of the Public Health Service, as chief of the new division.

Surgeon General Leonard A. Scheele said the Division of Engineering Resources will centralize planning and development of current and proposed programs of the Public Health Service in the expanding field of sanitary engineering and environmental health.

"In the present state of rapid development in the sanitary engineering field," Dr. Scheele said, "it appears essential that a division whose major activity is planning and development should be established."

Dr. Scheele described the purpose of the new division as being "to evaluate activities and more clearly delineate needs in environmental health."

Its creation, he said, is in keeping with steps now under way to enlarge the scope of environmental health activities in the Public Health Service.

Dr. Scheele said that the new division also will be responsible for the development of a program in radiological health and that it will consult with State and local health officials on the prevention and control of health hazards arising out of the use of radiation-producing equipment and radioactive materials.

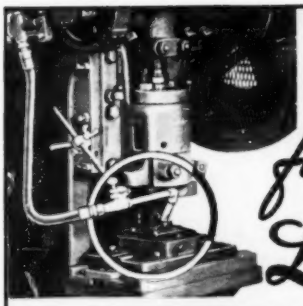
The head of the new division has been with the Public Health Service since 1942, with the exception of an interval between 1946 and 1948, when he served as Assistant Professor of Public Health at Yale University. A graduate of Yale, Mr. Pond holds Bachelor of Science and Master of Public Health degrees from that university.

Barrier Lotion for Dermatitis

EMPLOYEES in an Hawaiian fruit-processing plant spray their arms before going to work. As explained in the U. S. Public Health Service's "Industrial Hygiene Newsletter," the dermatitis-producing compounds of the fruit being processed include mild acids, small amounts of esters and alcohols and a protein-splitting enzyme. The use of this spray has reduced new cases of dermatitis from 20 to 2 a day.

To operate the unit, a worker simply inserts both hands in a spray cabinet and touches the trigger with the finger tips. A thin layer of the lotion covers the forearms, wrists, and hands. The spray time is about 3 seconds per worker. The lotion-holding tank is designed to provide for the continued mixing of the lotion and thus prevent separation.

According to F. A. Schramm, Chief, Bureau of Industrial Hygiene, Department of Health, Hawaii, each spray cabinet will be provided with an exhaust vent through the top. The fine mist which results from the spray operation will then be prevented from reaching the breathing zone of the person being sprayed. Study of this project continues in an effort to reduce the number of dermatitis cases further.



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THE Manufacturing Chemists' Association has announced the publication of Chemical Safety Data Sheets: SD-33 on Chlorosulfonic Acid, SD-34 on Tetrachloroethane, and SD-35 on Methyl Bromide. Designed for supervisory staffs and management, these data sheets present essential information for the safe handling and use of these chemicals.

The manuals set forth clearly the important physical and chemical properties of the three chemicals; the usual shipping containers and methods for their unloading and emptying; container storage and handling; and recommended personal protective equipment. Health Hazards and their control are covered authoritatively in a section prepared by the Medical Advisory Committee of the Association.

Each one of the Chemical Safety Data Sheets may be obtained at 20c per copy from the Manufacturing Chemists' Association, 246 Woodward Bldg., Washington 5, D. C. Remittance should be sent with the order.

THE INDUSTRIAL Nurse

EDITOR

ROSAMOND J. WEBSTER, R.N., A.M., Ph.D.

Physiotherapy

INDUSTRIAL accidents present a wide range of situations requiring many approaches to determine what may be needed in the way of physiotherapy. The young injured worker usually requires less treatment than the older worker who develops the presumably same condition. "Baking and Massage" have for a long time been standard recommendations and procedures. Often that is all that is available and nothing else is tried. Of course in many conditions that is all that may be needed. But advance in physiotherapy indicate that this one approach may not be enough. The old electrical machine may have long ago outworn its usefulness, even if it were ever of real help. Other accepted procedures may be outmoded in the light of more recent knowledge in this field. So too, instead of physiotherapy, surgery or even psychiatry may be needed. These remarks are intended particularly for those industrial nurses who take it upon themselves to assume responsibilities for physiotherapy. If it works, all's well and good. But if it does not, what then? The patient continues treatment unil he tires and quits. Medical advice must be depended upon, no matter how skilled a nurse may consider herself in this field.

Disability From Dust

AT THE last meeting of the International Association of Industrial Accident Boards and Commissions, questions relating to disability arising from dust exposures, received considerable attention. It was pointed out that pneumoconiosis, which means dust storage, may not in itself be of clinical significance, except in these ways: 1—The amount of dust in the lungs, even though inert, may become so excessive as to interfere with lung function mechanically. Recent experience indicates that excessive anthracosis acquired in industrial exposure may eventually lead to such pulmonary disfunction. 2—Irritating dust leading to reaction in the lung tissue, namely, in the form of dust granuloma, (an intense cellular reaction) or dust fibrosis. These interfere with lung function. 3—Pneumoconiosis favors complicating pulmonary infections which become even more harmful than the dust condition itself. During the past decade, preventive measures have been perfected and widely introduced in many of the industries in which dust hazards are present. These have materially reduced the incidence of occupational diseases. Nevertheless, there is a large residue of workers who in past years have had fairly intensive dust exposures, and whose pulmonary apparatus has thus been injured. They may appear in varying numbers in the years immediately ahead with evidence of pulmonary injury. The thing to remember is the hazard inherent in dusts of industrial origin, and the availability of fairly effective preventive measures. This spells out the need for appreciation of existing and readily available scientific information

Patient Personality

THE experienced clinician, as well as the well-trained and informed industrial nurse, personnel directors and administrators on various levels, practice and learn how to size up the patients who come to them, the people they select and direct. They understand the personality factors prominent in complaints of pain, illness, explanations, excuses, and reactions of various kinds. It is well recognized that the personality of a patient may highly color his version of an illness, depending on the individual. Some may be so constituted or circumstanced that they are consumed by genuine or imagined worries which may produce strange symptoms. If not properly treated, sympathetically and

with scientific understanding, such symptoms will interfere with the patient's return to normal life and work. The essence of the approach to such a worker or patient rests on a study of the personality of the patient, his daily experiences, his home life and work, his family situation and background, economic and other worries and complaints. In other words, questioning and analysis in the medical and nursing offices, as well as in personnel departments, are necessary for a clear understanding. Being a good listener and allowing adequate time, are two essentials for a measure of success in dealing with personality problems intertwined with medical manifestations.

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Retirement . . . . When?

A FEDERAL official recently took occasion to address a letter to a leading newspaper raising the question of validity of compulsory retirement at the age of 65. Summarizing his comments as follows, he took a distinct stand against the standard ruling: (1) No rule in any field of industry holds that a man of 65 is too old to be useful. Rarely do chronological and effective ages coincide. (2) Premature retirement often results in decreased production and profits for management and frustration for the workers. (3) The older worker has experience on his side to outweigh his age, if all other factors are of equal importance. These involve physical competence to do a full day's work and ability to produce at the standard rate. (4) The 65-year rule is easier to administer, but does many injustices. The problem of retirement at 65 or any other arbitrary age is looming of greater importance with the extension of the average length of life. The question of costs to industry and to the country as a whole are of equal importance. Shall men be kept in the non-productive group for an average of 5 or more years on fairly high pensions—or, is it more advisable, profitable, and humane to keep them at work an additional 5 or more years? These questions are not always easy to answer. Industrial nurses can aid in the long time study of this problem by keeping accurate records of ages, absenteeism, illnesses, visits to medical departments. In the end, such and other statistical data on production, accident rates, delay in healing, etc. will help to determine the best procedures to follow in given industries and in selected cases. No one rule will apply effectively to all.

Tension

OCCUPATIONAL disorders arising from overstrain, faulty working posture, work pressure, nervous tension, and wear and tear on the muscles of the skeletal system are often wrongly diagnosed as rheumatism and neurosis. This is the conclusion reached by two European medical investigators and reported at a recent International Congress on Rheumatic Disease. They reported that the diagnosis of "Neurosis" is sometimes made because the patient's pains vary with his state of mind. Perfunctionary examination may fail to disclose the organic cause of the muscle, tendon and joint pain. While a neurosis may often be a causative factor, the organic changes they hold, are even then due to overstrain and wear and tear of the skeletal muscles. Examination of several hundred female clerks revealed that more than half had fatigue pains during the working day. Management engineers and others in this country have for some time given attention to these workers. The visiting physicians recommended that preventive steps should be taken. They include inspection and correction of the employee's working site and manner of working, plus 10 minutes of daily light exercise in office hours, preferably under the direction of a trained physiotherapist. Presumably, such measures would apply scientifically to those workers who complain of pains and aches as indicated. Thinking about the complaints of workers has had an interesting history in this country and abroad. Perhaps the installation of the industrial nurse has been one explicit answer to this problem.

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Please send information on ( ) Amerifley Flexible Wood Link Matting; ( ) Tuf-Tred Tire Fabric Matting; ( ) Neo-Cord Counter-Tred Safety Matting; ( ) Ezy-Rug Colored Rubber Link Matting; ( ) Tile-Top Sponge Matting.

Name .....

Firm .....

Street .....

City & State .....

In Canada
Offices: American Mat Corp., Ltd.
Canada Trust Bldg., Windsor, Ontario
Factory: West Lorne, Ontario

Donora

TO MANY the name Donora may have no meaning. But in October, 1948 a heavy smog settled down over the area surrounding Donora, Pennsylvania. Weather men described it as a temperature inversion and anticyclonic conditions characterized by little or no air movement, prevailing over a wide area covering western Pennsylvania, Eastern Ohio and parts of Maryland and Virginia. This prolonged stable atmospheric condition was accompanied by fog and permitted the accumulation of atmospheric contaminants resulting in dense smog. Smogs of short duration are not unusual and except for discomfort due to irritation and nuisance of the dirt and poor visibility, no unusual significance is attached to such occurrences. This particular smog was of such density that it caused considerable local discussion. Streamers of carbon appeared to hang motionless in the air. Visibility was so poor that even natives of the area became lost. A number of residents became ill and within three days 17 deaths had occurred. With the coming of rain the smog was cleared away. But thousands of residents were made ill and caused much fear in the entire area. Various official agencies were drawn into the situation, including the U. S. Public Health Service. An extensive study was made and an extensive report published by the Service. Dr. Scheele, the Surgeon General, indicated that little fundamental knowledge exists regarding the possible effects of atmospheric pollution on health. Further, the Donora experience and extensive study of it has indicated the long range and the complex problem of overcoming pollution. Those concerned with similar problems are advised to obtain a copy of the full report. It is worth careful study.

Voluntary Health Insurance

EXTENSIVE discussion has been going on in the country on the matter of health insurance. Proposed legislation on a federal level has been prepared and backed extensively for enactment. On the other hand, many have expressed their opposition. A few months ago (March 30th) a voluntry health insurance bill was introduced in the U. S. Senate by a group of five senators. As indicated in the bill, the purpose is to make high quality hospital and medical care available to all by (1) providing protection to persons financially unable to pay all or part of subscription charges for prepayment of hospital and medical care; (2) stimulating voluntary enrollment in prepayment plans for hospital and medical care emphasizing employer participation in transmission of subscription charges and enrollment in rural areas; (3) strengthening and coordinating existing health resources. At the Federal level the program would be administered by the Surgeon General of the U. S. Public Health Service. Federal appropriations are authorized for such sums as may be necessary. Federal funds are to be matched on a variable percentage by funds from within the states. A higher percentage of Federal funds will be made available to states with lower per capital income. The state plan must provide that the state itself will put up at least 50 percent of the matching funds so that half or less than half of the matching percentages will come from local communities. The pressures for governmental health insurance plans is certain to continue! Information about these several plans should be available to industrial nurses.

WHERE

can you get
the latest equipment
to prevent accidents?
Consult The New 1950–1951

BEST'S SAFETY DIRECTORY

Alfred M. Best Co., Inc.
75 Fulton St.
New York 7, N. Y.

20 Most Popular

FREE BULLETINS & CATALOGS

July — November 1949

You, the readers of SAFETY ENGINEERING, have picked the 20 booklets, reviewed below, as the ones you most wanted to see. SAFETY ENGINEERING Reader Service Department presents these reviews again for those executives who may have missed the original reviews in the January–May issues.

GUARDS & TRAINING AIDS

Power Press Feeding Equipment 1

F. J. Littell Machine Co.—New, 4-page bulletin describes PRES-VAC air operated vacuum feeders and mechanical pickers. Cross-section diagram shows the feeder, with the component parts numbered and described thoroughly. A test graph, based on tests conducted by the Armour Institute of Technology, shows that peak performance is indicated at 451 lbs. air pressure.

Non-Repeat Device 2

Seargeant Metal Products, Inc.—This folder describes the company's non-repeat device for small bench presses or large floor presses. Acting as a secondary clutch, the easily installed accessory is released by the downward action of the ram, allowing the upper portion of the treadle rod to disengage the primary clutch. The press will not repeat until the treadle is brought to the up position.

Industrial Safety Awards 3

Williams Jewelry & Mfg. Co.—Well illustrated, 8-page booklet presents the complete WILLIAMS line of awards, emblems and trophies for accident prevention, "safe driver," and service programs. Complete ordering information, including price list, is presented.

Industrial Training Films 4

Commercial Films, Inc.—New, 100-page catalog describes and illustrates 327 currently outstanding ready-made films, projection equipment, and accessories. Among the many films described are those whose subjects cover: Supervisory training, industrial relations, mechanical skills, industrial safety, commercial vehicle safety, and health & first aid.

An Electronic Voice of Safety 5

American Allsafe Co., Inc.—4-page bulletin describes SAF-T-VOX, a small, compact unit for the recording and reproduction of safety messages, developed by the General Electric Co. and American Allsafe Co. Interesting text shows how SAF-T-VOX expands the safety engineer's educational program without putting a drain on his time. SAF-T-VOX will reproduce his message or warning as many times as desired wherever and whenever it is needed.

Accident Prevention Signs 6

Stonehouse Signs, Inc.—A convenient 12-page booklet illustrating various types of accident prevention signs. General subjects include signs for eye hazards, machine hazards, fire prevention, electrical hazards, elevator hazards, directions, first aid & sanitation, falling hazards, and traffic. Typical signs are illustrated in the colors approved by the A.S.A. code, and sign dimensions are listed.

PERSONAL PROTECTION

M. S. A. First Aid Equipment 7

Mine Safety Appliances Co.—New, 4-page booklet, No. FA-103, describes M. S. A. First Aid & Contest Equipment. Items covered include: the Contest Outfit, a completely equipped unit for first aid training and contests; the Emergency First Aid Outfit, a compact unit for storage at the mine working face; the Standard Stretcher Outfit and the Industrial First Aid Cabinet. A list of Pocket First Aid Packets is also included.

New, Improved Goggles, Spectacles & Helmets 8

American Industrial Safety Equipment Co.—Well illustrated, new 36-page catalog describes the many new and improved goggles, spectacles, helmets, face shields, lenses, plates and other items in the EYE-GARD and BODY-GARD lines of protective equipment. The user can easily identify the application of each product; recognize construction details, and select the right product to meet his exact requirement.

Protective Work Gloves 9

Edmont Manufacturing Co.—New, 12-page pocket catalog describes rubber, plastic and NEOX coated work gloves for industrial uses. Glove styles described and illustrated include: knit-wrist, gauntlet, and safety cuff; having coated palms only or coated palms and backs. Helpful chart aids in the selection of the glove best suited to specific work conditions.

Improved Industrial Vision 10

American Optical Co.—New, 24-page brochure describes sight conservation programs in industry. The booklet entitled: "Improved Industrial Vision, A Bonus for Management, A Benefit for Employees," features case histories and charts demonstrating the cost saving values of an industrial safety and visual efficiency program. The AO program provides a rapid check of vision under the supervision of members of the medical or optometric professions.

Soles for Safety Shoes 11

Gro-Cord Rubber Co.—Three informative booklets describe the features and uses for NEO-CORD, GRO-CORD, and GRO-CORK industrial shoe soles. Booklets point out many of the specific working conditions for which each sole is best suited. The information presented in these booklets will help supervisory personnel select the correct sole for each particular plant operation and hazard.

Question & Answers About Athlete's Foot 12

Onox, Inc.—New, interesting 4-page bulletin presents twenty questions and helpful answers on the subject of athlete's foot and its control. Some of the questions asked include: Why do we have skin trouble on the feet? How does ONOX kill the fungus? Does ONOX cure as well as prevent athlete's foot? Bulletin also shows how the ONOX skin toughening method keeps skin tough and resistant to the growth of athlete's foot fungi.

Liquid Soap and Soap Dispensing Equipment 13

West Disinfecting Co.—New, well-illustrated, 16-page booklet describes the WEST line of skin soaps and gives much information on the newly-designed, functional soap-dispensing equipment. Booklet contains many photographs and drawings, showing typical installations of soap-dispensing equipment in industrial plants, hotels, commercial buildings, stores, etc. Washroom maintenance problems are covered thoroughly.

FIRE & PLANT PROTECTION

Approved Ladders for Industrial Use .. 14

Patent Scaffolding Co.—Interesting, new 4-page booklet presents GOLD MEDAL Ladders and Scaffolding. Booklet states that Sectional Extension, Single, Platform and Step Ladders, and Extension Trestles have been inspected and approved by Underwriters' Laboratories, Inc. Complete information about sizes, construction, hardware specifications, etc. Ladder accessories, including ladder shoes, spikes and spur wheels are also described.

New, Lightweight Soda-Acid & Foam Extinguishers 15

Buffalo Fire Appliance Corp.—One-page data sheet introduces the new line of BUFFALO Better-Built fire extinguishers. These new extinguishers, made of stainless steel, are available in both soda-acid and foam types. Bulletin points out that this new line is 1/3 lighter than older extinguishers; stronger by more than half.

Dry Chemical Fire Extinguishers 16

C-O-Two Fire Equipment Co.—Interesting booklet describes the new line of C-O-Two Dry Chemical extinguishers. Booklet gives complete information on the properties of dry chemicals; methods of using dry chemicals on various types of fires, etc. The operating principle of this unit, available in 20 and 30 lb. sizes, is explained thoroughly.

How to Put Rope to Work in Industry 17

Plymouth Cordage Co.—New, 32-page booklet, one of a series of PLYMOUTH Data Books for rope users, shows how you can put rope to work in your industry. Some of the subjects are: How to determine rope size; reeving methods, slings and lashings, whipping a rope, how to make rope splices, how to tie knots, 15 ways to make rope last longer, and tackle terms and definitions.

Modern Floor Maintenance Methods .. 18

Masury-Young Co.—16-page booklet describes the latest methods of floor maintenance; and shows the complete line of MYCO Floor Maintenance Materials and Equipment. A helpful chart shows the correct method of cleaning, sealing and polishing all types of floors. Specifications for each of the many MYCO products are given.

Approved Hazardous Location Heating Units 19

Electromode Corp.—New, 2-page data sheet describes the explosion-proof ELECTROMODE heater for hazardous locations. It is pointed out that this heater is the first all-electric explosion-proof unit to comply with Underwriters' Laboratories specifications for Class I, Group D atmospheres containing gasoline, naphtha, acetone, benzol, lacquer, etc. Bulletin presents schematic diagrams of three basic models of the heater unit.

Lightweight, Flexible Ventilating Hose . 20

American Ventilating Hose Co.—Catalog # 30, a 16-page booklet, describes the complete line of "FLEXAUST" flexible hose for all industrial uses. Described are: PORTOVENT, a ring-reenforced hose; BLOFLEX, non-reenforced collapsible hose and all types of accessory equipment. Illustrations give many uses. Installation data, price list, general information and engineering data are presented in detail.

WRITE NUMBERS CORRESPONDING TO THE ITEMS HERE ☞

Your Company Name_____
(Please Print)

_____

Address_____

_____

Your Name_____

Your Title_____

Return This Coupon To:

SAFETY ENGINEERING
75 Fulton Street
New York 7, N. Y.

December, 1949

NEW PRODUCTS

For illustrated descriptive literature of products listed in this section readers may apply
TO SERVICE DEPT., SAFETY ENGINEERING MAGAZINE
Edited by Geraldine E. Richardson

FLAME-SEAL PAINT

FLAME-SEAL, a new fire retardant paint already has been tested, approved and listed by Underwriters' Laboratories Inc.

Stressing the fact that firemen often consider smoke and poisonous fumes released by burning paint to be more deadly than fire itself, company executives point out that Flame-Seal is unique because it gives off no toxic gases either while being applied or when exposed to fire.

When fire attacks a combustible material which has been coated with Flame-Seal, the paint undergoes a complete physical transformation. It forms a crust-like protective wall at least 8 times the thickness of the original coating.

The coated material can withstand the direct attack of an intense alcohol flame for more than one hour without any sign of flame spread.

Described as easy to apply, the new fire retardant paint comes ready to use, requires no mixing of special chemicals, and can be applied directly from its original container by brush or pressure spray gun. Flame-Seal may be applied during any weather conditions, and during any season of the year.

It is recommended as an ideal protective coating for use on all interior wood or partition board walls, ceilings, basements, attics, stairwells, dumb-waiters, kitchens, barns, stables, farm houses, warehouses, factories, schools, churches and hospitals.

In addition to protecting wood surfaces, Flame-Seal is also said to be highly effective as a fire retardant coating on cardboard, plywood, celotex, insulite and other types of partition board. Moreover, the Flame-Seal coating can be cleansed with a damp cloth without affecting its protective qualities.

Packed in 1, 2, and 5 gallon pail-type metal containers, Flame-Seal "Standard" is available for immediate delivery in oyster white semi-flat finish, and Flame-Seal "Imperial" in a range of 6 pastel colors.

BARRICADE TAPE

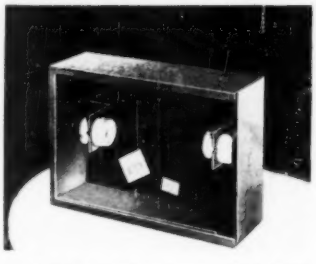
BRENTON Barricade Tape is a new and effective device for marking off hazardous areas where energized equipment is in service, or other hazardous electrical conditions exist. This tape has been adopted as standard by several companies after exhaustive tests showed substantially increased protection over previous marking methods.

Brenton Equipment Company, of California, recently introduced this tape in yellow and black combination which may become adopted as standard. Other color combinations are available.

Brenton Tape is made of woven Saran plastic, five-eighths inches wide. It is sunfast, impervious to moisture, non-conducting and does not stretch. It is easily handled and has high tensile strength to insure long life. Use the convenient coupon.

"EXIT" SIGN GLOWS IN DARK

THIS new series of "Exit" and "Fire Escape" sign boxes again brings into Safety application the advantages and



benefits of phosphorescence, which keeps the signs glowing long after every other light source is gone.

They carry the U. L. Approved label, along with a union label and in addition, are available at what may be considered definitely attractive cost.

Many cities and states, including Chicago, have approved this type sign for installation without separate service. In many localities, they may be wired to present system. They are manufactured by All American Products, of Illinois. Complete illustrated literature may be had by sending in the coupon.

FLOOR TREATMENT

REALIZING that cleanliness and speed are the two big goals in a good dirt control program, Huntington Laboratories, Inc., have developed a new emulsifiable mop dressing—Huntolene Emulsifiable Floor Maintainer. The new product is recommended as a daily treatment for floors, walls, furniture, even blackboards. It cleans quickly and thoroughly because it gets all the dirt on contact.

It is also claimed that once a surface has been Huntolene-cleaned every day, dust clings to it, can't get into the air again for further circulation.

Because it emulsifies, or mixes with water, Huntolene breaks up into microscopic parts when a treated mop or cloth is washed. These particules are suspended in the water and float away, so that embedded dirt and grime wash out completely, leaving the mop clean and fluffy, sanitary and easy for the custodian to handle.

The new product leaves a fine film that helps to prolong the life of sealed, varnished, waxed or unfinished surfaces.

Send the coupon for a fact-filled booklet giving full information about the Huntolene cleaning and sanitizing program.

FLUORESCENT TUBE DISPOSAL UNIT

TO RESTRICT the hazards of fluorescent tube handling, the Standard Safety Equipment Co. has developed a safe and economical Fluorescent Tube Disposal Unit. The two sources of danger—beryllium, a toxic chemical, and the broken glass—are easily and safely controlled by collecting the glass fragments in a disposable container and washing away the poisonous chemical with a constant flow of water. This new unit is constructed entirely of steel, requires only one man operation, and destroys a tube in less than ten seconds.

A used fluorescent tube is inserted through a gravity door at the upper end of a 3" diameter, 4' length steel enclosure. At the lower end of the enclosure a rotating blade breaks and grinds the tubes and a steady flow of water rinses the broken glass and carries it into a porous cloth bag—the toxic powders are washed away and the glass fragments contained within the bag. When this expendable porous bag is full it is placed in a multiwall sack which is inscribed, "Danger Broken Fluorescent Tubes." With the

porous bag within the multiwall sack, workers and handlers are protected.

Complete details of price, operation, and shipment, may be had by sending coupon.

NYLON SAFETY STRAP

FINAL tests have been completed on the first Nylon Safety Strap on the market, now in production by the Buckingham Manufacturing Co., Inc. of New York. The results of laboratory and field tests show exceptional qualities of strength, durability and flexibility in comparison with belts made from other fabrics and leather, according to Walter E. Craw, company president.

Multiple plies of nylon, specially woven from high-tensile fibres, are laid together in neoprene and vulcanized. This construction achieves the desirable combination of pliability, ease of handling and lightness with strength.

Three times stronger than high quality harness leather, nylon also provides extreme resistance to abrasion. Even in severest cold, it keeps its flexibility.

SAFETY SPINNER

AWARD Incentives announces their clever aluminum or bronze disc that spins out the message "Don't Gamble with Safety—You're It," and carries any firm advertising imprint on the reverse. This is an inexpensive and novel method of reminding employees of the necessity of safety on the job. The manufacturer suggests its use as a constructive public relations giveaway. Please use the convenient coupon.

FYR-CRY ALARM

THE Fyr-Fyter Company of Ohio has placed on the market a newly perfected automatic fire alarm for homes, industry, institutions and commercial establishments. Don O. Wood, Executive Vice President and General Manager of the company in making the announcement stated, "there has been many so called automatic fire alarms developed in the past, but this is the only one I know of to carry the Underwriters Laboratories re-examination service Label and approval."

Known as the Fyr-Cry, this alarm is mechanically built and operated like a fine clock. The mechanism is copper plated to prevent rust and thus prompt

operation at the time of a fire is assured for a life time. The Fyr-Cry is designed for installation where fire is most likely to break out. It is completely automatic, a special fuse releasing the alarm the moment the temperature in a room rises above 133 degrees. (Most fires attain a temperature of 1500 degrees within a very few minutes.) Once this alarm is installed on the wall or ceiling of a building it requires no attention. No electricity is required to operate the Fyr-Cry so there is no upkeep cost or danger of power failure.

An 8 inch steel bell gives out a loud clear gonging sound for 5 minutes once a fire starts.

The new alarm can be installed on the wall or ceiling of any room and adds beauty to any surroundings. The unit may be installed singly or in multiples. Please send in the coupon for complete details.

EXTINGUISHER DECALS

TO HELP identify and locate the right fire extinguisher in a hurry, the Meyercord Co. of Illinois reports the development of two unusual new decal sets for positive selection in two fire classifications —1) wood, paper, or rubbish; and 2) electric, gas or chemical.

A large decal is supplied for application to the wall above the fire extinguisher, and a smaller one for the extinguisher itself. The new decals identify in three ways: by actual copy naming the type of fire, by design, and by color code.

The decal selection sign for fires of wood, paper, or rubbish origin has black and yellow diagonal bars. For electric, chemical, or gas fires, the identifying design is red and white with horizontal bars.

Further details regarding these copyrighted designs may be obtained by sending in the coupon.

December, 1949

To SAFETY ENGINEERING

75 Fulton St., New York 7, N. Y.

For prices and complete details of items mentioned in this month's "What's New in Safety Products," check items that interest you and mail coupon.

- ☐ Flame-Seal Paint
- ☐ Barricade Tape
- ☐ Exit Signs
- ☐ Hutolene Floor Treatment
- ☐ Fluorescent Tube Disposal
- ☐ Nylon Safety Strap
- ☐ Safety Spinner
- ☐ Fyr-Cry Alarm
- ☐ Extinguisher Decals

Firm Name .....

Attention of .....

Position .....

Firm Address .....

City .....

NOW for a better fit, more comfort, longer wear

NEW, IMPROVED

NEOPRENE HOOD INDUSTRIAL

CURVED-FINGER GLOVES!

HOOD has done it again! For years, HOOD gauntlets and knit wrist gloves have been the choice of industry. Today, the new, improved models are ready to provide new comfort and safety for *vital* hands. Exhaustive tests *prove* their superior wear! There's ample knuckle allowance! Fingers and thumbs are curved for more efficiency! Gauntlet shown has thumb crotch reinforcement! There are no seams on the working surface! Knit wrists are *color fast!* Both models are bigger, more flexible! Yes, be sure of new protection, new efficiency with the new, improved HOOD Industrial Gloves. Order from your jobber today!

HOOD for Safety plus

HOOD RUBBER CO.
Watertown, Mass.
DIVISION OF THE B. F. GOODRICH COMPANY

New Corporation Set Up to Market Absorbents

SPEEDI-DRI CORPORATION, a new firm, has been created to market oil and grease absorbents in the New England states, New York, Eastern Pennsylvania and part of New Jersey.

Its president, R. H. Hubbell, Jr., announced that the company was incorporated October 31, 1949. Other officers are: Warren E. Sawyer, Jr., vice-president, secretary and treasurer; and R. A. Hogan, sales manager. The firm has established its main headquarters at 210 West Washington Square, Philadelphia. All sales will be handled by the New York City office at No. 1 Wall St.

Waverly Petroleum Products Company, Philadelphia, will continue as distributors for the absorbents in Western Pennsylvania, the South, the Middle West, West and Southwest.

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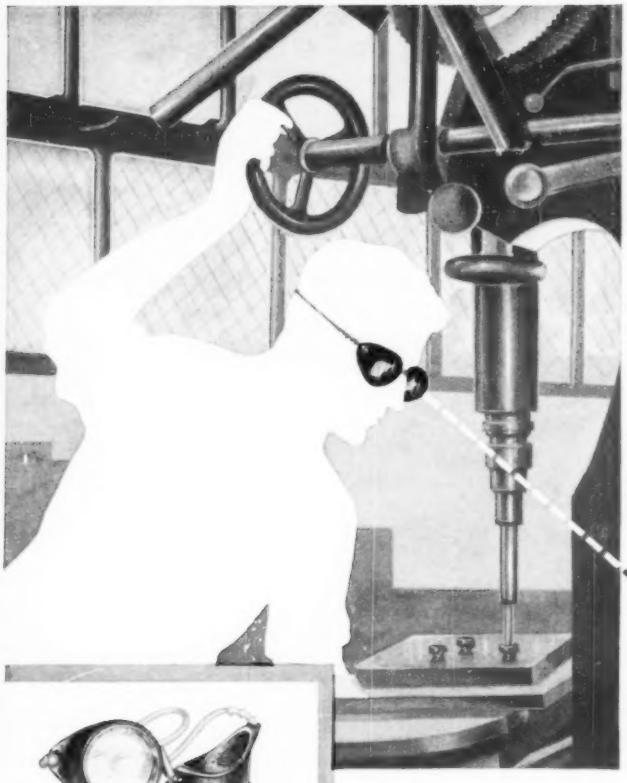

NO DANGER

TO EYES!

–with CESCO PROTECTION

CESCO's new 545 cup-type goggles feature Comfort-King headband —which holds goggles firmly with 30% less tension. Available in models for welding, chipping, acid handling and where dust protection is required.

CESCO Face Shields assure complete frontal protection and all-essential comfort necessary for continuous wear. In wide range of plastic window sizes with open top or deflector crown.

• You assure your workers maximum eye protection with quality-tested CESCO Goggles and Face Shields. Your workers assure you they will be protected because CESCO Goggles and Face Shields are easy and comfortable to wear. CESCO protection and comfort means your work-stoppage is reduced to a minimum—an important factor in today's production.

CESCO protective equipment is used in plants where safety standards are the highest. That's a recommendation to you.

***YOU** can improve safety conditions in your plant by reading CESCO's new 64-page publication—"Where to Use, How to Use and How to Select Industrial Protective Equipment." Write for your copy today!*

CHICAGO EYE SHIELD CO. **2310 Warren Boulevard • Chicago 12, Illinois**

CESCO FOR SAFETY

CESCO

OFFICES IN: Boston, Buffalo, Cincinnati, Cleveland, Columbus, Dallas, Detroit, East Orange, Houston, Los Angeles, Montreal, Philadelphia, Pittsburgh, Seattle, St. Louis, St. Paul, Toledo, Tulsa

TIME FOR *Thantis* LOZENGES

For throat irritations 'Thantis'* Lozenges provide effective relief. 'Thantis' Lozenges are especially beneficial in soothing these conditions because they are both antiseptic and anesthetic for mucous membranes of the throat and mouth. These effects are due to the two active medicinal agents, 'Merodicein'* an antiseptic of low toxicity, and Saligenin, a mild local anesthetic. When 'Thantis' Lozenges are dissolved in the mouth, the two ingredients dissolve slowly, providing prolonged medication of the throat.

Each lozenge contains 'Merodicein' (H. W. & D. brand of monohydroxymercuridiiodoresorcinsulfonphthalein-sodium) 1/8 grain, Saligenin (orthohydroxybenzyl-alcohol, H. W. & D.) 1 grain.

Supplied in vials of 12 lozenges in individual cartons.

*Reg. U. S. Pat. Off.

H&D

HYNSON, WESTCOTT & DUNNING, INC.

BALTIMORE, MARYLAND